RSALOP

Radionuclide Soil Action Levels Oversight Panel

Panel Work Session Records

1997

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1998/1999

SHEET NO. .... OF ....
JOB NO. R.F. SAL
BY L. Schnoor
DATE 9/15/97 TIME 1PM

City of Broomfield
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SAL Mtg Brmfld Senior Center

Jim Fiore – Al Alm continues to be keenly interested in our situation

Jessie Robinson – we can not solve how clean is C
– they believe action levels are adequate, but they recognize need for independent review
(1) 85/15 dose std
(2) validity of ResRad Model
(3) inputs & assumptions to model
– NRC rule 25/100
– NAS review? Tim Rehder will fill in here.

Tim Rehder – EPA
– Nat'l Academy of Sciences is currently "BEIR V" reviewing report
(Bio Eff Ion Rad)
– they are looking at the linear relat of dose response at low levels
– "linear, no threshold approach" is being challenged

Joe Goldfield – what has been done in other places around the world

Tom Marshall – he feels that we will need more time to respond to DOE & EPA opening remarks

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SHEET NO. ..... OF .....

JOB NO. .....

BY .....

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Objectives: Scope of Sudop Revised Ground Rules "
Candidates to Conduct Reviews
How do you pull it all together

Tom D scope of reviews needs to include RESRAD & dose limits 15/85 mrem stds
Attachment B to Appendix G
wait to who should conduct this
for this establish a local body CAB + cities

Mickey – national group + local group to take turns on a site specific basis

Hank – need to include world wide review of other standards set
– review every parameter for site specific natural
– EPA & the state will be sanctioning a waste disposal site without the proper notification
– doesn't think dose can be separated out from the reviews

Jacque B. – struggling w/ logical way to attack the problem w/out taking too long

Deanne – no position on 15/85 mrem
– the basic focus of RESRAD that gets to 15 pCi/g in soil
– a lot of discomfort in the translation from dose to SAL
– support independent reviews

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Sam Dixon – needs to be an apolitical process
need a clear scientific review

Victor – there is evidence that Pu may migrate off site and ER may be more urgent than was once thought
– Actinide Migration Study is very important and needs to be brought in

Joe – Time is now a factor – Pu more mobile than once believed – sense of urgency definate need to know amt of Pu in the soil
Pu in soil around bldgs in industrial area

Hamel – altitude – addtn'l mrem dose due to elevation – national std do not apply
needs to be site specific

LeRoy – need to be specific – dose translated into risk – needs to be clearly communicated
– most cautious approach spelled out and clearly communicated (range)
– most conservative in each assump-on
RESRAD model spelled out
– studies of low dose rad. exposure (not high dose survivors from Hiroshima & Nagasaki)

Mickey – re-iterated translation from dose # to pCi/g # is the key factor

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Jessie - We can agree on these things:
- need to review BesRad as an appropriate
- need to review Assumptions/Input to BesRad
- Actinide migration data
- site-specific
- substantive public participation

From a public education & understanding perspective there is value to looking at other places around the world.

Kim - in review of appropriateness of the BesRad model & other places processes need to be reviewed - how did others arrive at translation from dose to soil action level - not necessarily the numbers they got, but the process they used.

Reed 15/85
- needs to be examined by someone
- define how we can move forward on this issue
-

Jacque - 15/85 Review - National separate but parallel reviews of dose limits
- Would require contacting NAS & EPA at HQ level & see if we could pull it off
- describes a process used by Dept of Defense on incinerators

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SHEET NO. 5 OF

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BY

DATE TIME

Tom - Are EPA, DOE, interested in exploring what Jacque proposed - Tim had said they are not (EPA), Jim (DOE) say they are not.

2 Parts under consideration
w/ local public participation
- Independent Review of ResRad & applicability (site-specific)
- actinide migration

- Participate in current Nat'l review of dose stds (EPA/NAS, etc)
open the door to expansion
Public Oversight
Communication

Deanne
Jacque will flesh out a proposal - w/ other appropriate public involvement

Joe - repeating again - 15/85 translated to soil action level is the problem & there is discrepancy is various translation

Dave - Independent review "panel" rather than a person or agency to do the review

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22 AM
23
24 AM
29 or 30

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(1.) — Is there an indep. agency that everyone trusts NAS + others

or

(2.) everybody agrees on people who meet the criteria

Its O.K. to have 5 - if only like 3 of the 5 but that's ok there are cks & balances to make sure all aspects & perspectives are addressed

What should the process be?

group today → design team → audit group → select independent contractor to do indep. study

design team:
- CAB + local Gov.
- varied stakeholders represented
- design options & bring back

audit group:
- HAP
- w/ expertise required

select contractor:
- NAS
- others

Design Group

Hank, Nicky, Victor, Kathy, Tom Lekay, Joe, Ken

- need product by 10/6/97
- product available at Oct. CAB Mtg

E-what process is or options
E-options for indep. review

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RESPONSIVENESS SUMMARY FOR SOIL ACTION LEVELS

November 6, 1996

RESPONSIVENESS SUMMARY FOR SOIL ACTION LEVELS

Comment:

Promulgate national standards before setting them for Rocky Flats.

Response:

Finalizing national standards can be a lengthy process, sometimes taking years. The Parties to RFCA believe that ER work is too important to delay for the following reasons:

- Heavy precipitation events like the one in May 1995 could transport some of the contaminated soils away from their current location making the cleanup more complicated and expensive in the future.
- Certain off-site disposal options that are available at present, such as Envirocare may not be available in the future. Off-site disposal options could be more expensive in the future.
- Rocky Flats currently has staff experienced in ER projects and knowledgeable about the geology, hydrology and ecology of the site. If ER work were to be delayed for a number of years, DOE and its contractor would probably lose much of that expertise.
- The Ten Year Plan calls for DOE to cleanup approximately 50 of the high-priority individual hazardous substance sites (IHSSs). To accomplish that goal, the Site need to make significant progress during the first five years of the plan, and not backload all the ER work into years six through 10.
- We must look at the very real possibility that site budgets will decline in the future when high priority tasks such as SNM consolidation and stabilization have been completed.

The draft EPA regulation is consistent with other promulgated or proposed national standards that establish 15 mRem/year as an appropriate level of protection. These standards include:

- WIPP Certification Criteria (40 CFR 194),
- Standards for Spent Fuel, High-Level and Transuranic Waste (40 CFR 191), and
- NRC's Proposed Rule published in the Federal Register on August 22, 1994 (59 CFR 43200).

A national debate over the draft EPA Radiation Sites Cleanup Rule will take place. Should the rule change as a result of the debate, the interim soil action levels for Rocky Flats will be revised accordingly.

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Comment:

Focus first on the Special Nuclear Material (SNM) stabilization.

Response:

The DOE, EPA and CDPHE agree that SNM poses the highest risks at Rocky Flats and that stabilization of SNM should be the site's highest priority. However, the site also has the budget and resources to perform environmental restoration (ER) work now. The parties believe that given the large amount of ER work that needs to be done, it is important to begin that effort as soon as possible.

Comment:

The interim action should not add 85 mRem to the Denver area's high level of naturally occurring radiation.

Response:

When EPA developed its draft Radiation Sites Cleanup Regulation, it chose the 15 and 85 mRem/yr dose numbers because they were fractions of the 100 mRem/yr dose number that the International Commission on Radiologic Protection (ICRP) has stated is protective of public health. The ICRP is an international body of health physicist that researches radiation exposure and sets standards for radiation protection. When the ICRP developed the 100 mRem/yr number, it considered locations such as Denver where the background radiation levels are high. Therefore, the EPA, DOE and CDPHE believe it is appropriate to apply the standard to Rocky Flats.

Comment:

Is budget driving soil action levels, or are soil action levels driving future funding scenarios?

Response:

The projected budget was not a consideration in setting any of the parameters in the Action Levels and Standards Framework, including the radionuclide action levels for soils. The parties examined the issue from a scientific and technical perspective and derived the action levels to be protective of human health and the environment. The resulting projected volumes of remediation waste to be managed in the future and the associated costs were only determined after the scientific and technical analysis was completed.

Similarly, soil action levels for radionuclides are not a key driver for future funding. DOE HQ has given the Site the planning levels for funding for the entire Ten Year Plan. The target levels of funding were not based on the soil action levels but are essentially a flat funding scenario. Additionally, when the closure of the site is looked at in its entirety, the costs associated with the soil cleanup are relatively small in comparison to those associated with activities related to special nuclear materials.

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Comment:

Conduct additional modeling and documentation of the prospect for any future loadings and initiate corrective action to strive for zero offsite releases.

Response:

The Preamble to the Rocky Flats Cleanup Agreement states that "At the completion of cleanup activities, all surface water onsite and all surface and groundwater leaving RFETS will be of acceptable quality for all uses."

It is in the Site's best interest to identify cost-effective means to reduce active management of environmental contaminants and potential offsite releases. Therefore, the Site is pursuing cleanup and control methodologies using the advice of the Actinide Migration Panel, implementing watershed improvements and the Pond Operations Plan and working with the cities and regulatory agencies to implement the Integrated Water Management Plan.

The Community Advisory issued October 18, 1996, states "DOE commits to conducting further investigations of plutonium migration in surface water and groundwater, including potential impacts of future accumulation of contaminants offsite due to migration from Rocky Flats. These investigations will result in a clearer understanding of how high precipitation events affect the residual plutonium in soils at Rocky Flats." The next meeting of the Actinide Migration Panel will take place within the next several months. The panel will be finalizing a report on the Evaluation of Existing Data On Actinide Migration at the Rocky Flats Environmental Technology Site and making recommendations that may influence the prioritization of cleanup activities and requirements for additional data required for engineering remediation activities. Panel meetings have always been open to the public.

Comment:

Conduct feasibility research into cost-effective ways to remove areas contaminated with residual plutonium.

Response:

DOE is assessing cost-effective ways to remove areas contaminated with residual plutonium. As previously stated, the next meeting of the Actinide Migration Panel will take place within the next several months. The panel will be finalizing a report on the Evaluation of Existing Data On Actinide Migration at the Rocky Flats Environmental Technology Site and making recommendations that may influence the prioritization of cleanup activities and requirements for additional data required for assessing remediation activities.

In 1997 the Kaiser Hill Team will begin addressing the 903 Pad and Lip Area. An IM/IRA or PAM that outlines the proposed action will be submitted for public review and comment. The 903 Pad and Lip Area represents the major portion of surface soils on site contaminated with residual plutonium and is one of the site's highest priorities.

/1

The Kaiser-Hill Team continues to implement the Industrial Area IM/IRA monitoring program to identify any previously unidentified sources of plutonium and americium contamination. Individual watersheds are monitored to identify new sources of contamination.

In addition, the Kaiser-Hill Team is constantly evaluating new technologies for detection and remediation of radionuclides in soils, sediments and groundwater. For example, Kaiser-Hill is working closely with DOE's complex-wide subsurface task force in evaluating and implementing new cost-effective technologies to address subsurface contaminants.

Comment:

Conduct periodic review of the interim action levels and new remediation technology.

Response:

In addition to the annual review prescribed in paragraph 5 of RFCA, the agencies will be responsible for conducting an internal annual review of the soil action levels. An annual report summarizing the review will be given to the public. Questions that will be addressed on an annual basis include:

1. Is there new scientific information available that would impact the interim action levels?

2. Has a national soil action level been promulgated within the year? If yes, the parties commit to revisit Rocky Flats' interim action levels.

3. How were the interim action levels applied to the site over the course of the year?

4. Have the remedies been effective?

Comment:

Establish an autonomous board for remediation activities.

Response:

Establishing an autonomous board that ensures appropriate oversight for remediation activities is not necessary because each proposed cleanup action is subject to public and regulatory scrutiny through the CERCLA process. This process ensures that all proposed cleanup actions must first go through a public and regulatory review. Additionally, stakeholders groups such as the Rocky Flats Citizens Advisory Board (RFCAB), Rocky Flats Local Impacts Initiative (RFLII) and others were established to provide such external review. An additional layer of oversight would be redundant and is not warranted.

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Comment:

Although it may be necessary to return contaminated material to the ground in the interim, it is not an acceptable long-term state.

Response:

Soils, once extracted as part of a remedial action, may or may not be returned to the ground. Put-back levels are those levels at which excavated soils will be allowed to be placed back into the ground. Soils with radionuclide levels below Tier II action levels may be replaced; soils with radionuclide levels above Tier I action levels may not be replaced. Decisions regarding soils containing radionuclide levels between Tier I and Tier II will be determined on a case-by-case basis. Because many of the variables used to determine put-back levels are project-specific, put-back level decisions should be made and explained within the decision documents associated with those actions. Decision factors to be considered include remedy effectiveness and protectiveness, anticipated future land uses, contaminant levels in surrounding soils, and costs.

The agencies believe that soils containing radionuclides below the action levels are protective of human health and the environment for the interim. Performance monitoring will be required to ensure that the selected remedy was effective. The frequency and location will be determined on a case-by-case basis. The site will also conduct an annual review to determine all applicable new and revised statutes, regulations, written policy and guidance. In addition, an evaluation of the entire site at the completion of the interim actions will be taken at the time of the final CAD/ROD for the site to determine if residual contamination warrants further action. If further action is warranted, the exact location of soils returned to the ground is known and is part of the administrative record for that action. This knowledge will allow the soils that require further action to be easily located for either treatment or removal.

Comment:

The action levels should be based on projected use and cost/benefit analysis.

Response:

In developing the action levels, the agencies based their recommendation on the anticipated land uses outlined in the Rocky Flats Vision. No formal cost/benefit analysis was performed, but cleanup of the Site to these projected uses will ensure that the surrounding communities receive the benefit of cleanup that is protective of human health and the environment at a reasonable cost.

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Comment:

The most cautious approach should be taken for the RBE (relative biological effectiveness) for plutonium. All potential health risks should be assessed, not just cancer.

Response:

Federal radiation protection standards for the public are based on an annual radiation dose limit. This annual limit is based on the sum of external radiation dose and internal radiation dose. A quality factor of 20 is prescribed for use by these federal agencies for quantifying internal radiation dose from plutonium. Therefore, a quality factor of 20 was used to calculate plutonium action levels. This quality factor of 20 was chosen by the ICRP and the NCRP based on a range of RBE values. RBE values are variable, based on the type of organ, the type of radiation, the type of effect and the type of radionuclide being evaluated.

For exposure to radioactive material in the environment, EPA has stated that the most significant consequence of this exposure is cancer induction. Therefore, EPA believes that cancer risk may be used as the primary basis for assessing radionuclides in the environment.

Comment:

In calculating soil contamination, use readings from specific soil samples rather than averages from multiple samples.

Response:

There will not be enough time or money to sample every square foot of Rocky Flats. Therefore some amount data averaging will need to be employed and discrete data points will be used to represent the contamination level of relatively large areas. The amount of averaging employed will vary from project to project depending upon the size and shape to the contaminated area, amount of historical information known about the area, and the sensitivity of direct-reading, field instrumentation. Data points scattered around large geographic areas will never be averaged to make a determination as to whether an area is above or below the action levels.

It is common in environmental restoration work to use a combination of discrete samples (collected at a single location) and composite samples (collected for multiple locations and combined into a single sample) in the site characterization process. At Rocky Flats, analysis of soil samples will be used in conjunction with direct-reading, field instrumentation and best professional judgment to locate the soils that exceed the action levels for radionuclides.

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Comm

Use m onservative numbers for respirable fraction of soil; breathing rate c ation; erosion or migration.

Respo

The pa ters were chosen for input to the RESRAD code to be as site specific as possibl that the characteristics of the Rocky Flats Environmental Technology Site (RFET e represented. This is important since all radiation site cleanup actions are unique must assess different concentrations of radionuclides with variable enviro al conditions. These site specific conditions must be incorporated into the RESR ode to assure that cleanup levels are health protective.

Inhala xposure is assessed by examining the amount of radioactive material present in the air he inhalation rate of an individual. To calculate the amount of radioactive materi air, it is first assumed that there is a direct correlation between the concentration of radi ive material in air and the concentration of radioactive material in soil (i.e., (pCi/g air/(pCi/gram)soil = 1). This is a very conservative assumption since empirical data ha own that this ratio is actually much less than 1.

The ne tep is to define the amount of respirable dust present in the air. To calculate radiatio ose, the annual average PM-10 concentration (the concentration of dust with a diamet f <10 micrometers) should be used to represent the amount of respirable dust presen The annual average concentration should be used since radiation dose regulations are wri on an annual basis. The PM-I0 concentrations for six air monitors at RFETS were e mined for the years 1990 through 1995 to assess the respirable dust present at RFETS. To be conservative, the PM-10 concentration was maximized by using the air monitor closest to the Standley Lake surface water project during construction activities for that project over a five month period. The annual average was actually much less. Due to the use of an air monitor next to heavy construction on a short term basis, the respirable fraction used in the RESRAD code is conservative while assuring that site specific data is utilized.

The breathing rates chosen for use in the RESRAD code are considered Reasonable Maximum Exposure (RME) parameters by the EPA and are used at environmental restoration sites throughout the country. RME parameters represent the highest exposure that EPA believes is reasonably expected to occur at a site (in this case, the highest inhalation rate).

The soil erosion rate was chosen to be as site specific as possible. Soil erosion rates were taken from a report entitled Estimated Soil Erosion and Associated Actinide Transport for the South Interceptor Ditch Drainage. This is the best site-specific erosion rate data available for use at RFETS.

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Comment:

Consider effects of events such as fire, storm events, etc.

Response:

EPA's draft 40CFR196 is based on protecting individuals due to a chronic exposure to radionuclides in the environment. This chronic exposure is apparent in EPA's regulation since cleanup levels are based on an annual radiation dose due to chronic exposure to radionuclides in soils. The assessment of short term exposures (i.e., fire, storm event) is not required by EPA's draft standard. Even though these short term events are unusual, the soil action levels should not be compromised. First, it is anticipated that an individual would seek protection from a short-term event and not remain in the area. Radiation dose from a short-term event decreases with increasing distance from the event since resuspended soils readily disperse in air. Also, the amount of soil that an individual could be exposed to, on a short term basis, is limited by the duration of the event. These circumstances will combine to limit an individuals radiation dose from soils during short term events.

Comment:

Utilize ALARA and ARAR in determining the standard.

Response:

The As Low As Reasonably Achievable (ALARA) philosophy is used in radiation protection to assure that radiation dose is reduced to acceptable levels taking into account technical, social and economic factors. In determining its radiation dose requirements of 15 mRem and 85 mRem in 40CFR196, EPA performed an analysis that is functionally equivalent to an ALARA analysis. Specifically, EPA performed the following:

- A detailed review of prior decisions made by the federal government to address environmental risks with special emphasis on decisions concerning radiation and site remediation.
- A technical analysis to ensure that the cleanup standards being considered would be both achievable and measurable.
- A cost analysis of various cleanup levels.

An ARAR is an Applicable or Relevant and Appropriate Requirement (ARAR) under EPA's environmental restoration program and is used to identify requirements that need to be addressed during environmental restoration activities. Current and proposed regulations from the EPA, DOE and the Nuclear Regulatory Commission (NRC) were reviewed for use at RFETS for deriving action levels. EPA's draft 40CFR196 was chosen for use due to the following:

- Remediation activities at the RFETS follow EPA and State of Colorado remediation requirements as outlined in the Rocky Flats Cleanup Agreement. For radionuclide remediation, EPA's most current regulations were addressed.

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- 40CFR196 is based on an extensive review of available radiation protection information.
- 40CFR196 is not inconsistent with the requirements of DOE Order 5400.5, DOE's draft 10CFR834 and the draft NRC decommissioning regulations.
- NRC regulations only apply at DOE facilities in limited situations.

Comment:

The action levels are not protective of long-term public health because of the large uncertainties associated with radiation exposure from plutonium, americium and uranium and, particularly concerns with the RESRAD projected long-term migration to the East -- downwind and down elevation gradient -- of on-site radionuclides.

Response:

The action levels are interim and were developed to be protective of public health using the most current scientific knowledge provided by the International Commission on Radiological Protection and the National Committee on Radiation Protection and Measurement, as well as the Environmental Protection Agency. Any new, validated scientific knowledge that indicates the action levels are not protective of public health would result in revision of the action levels to make them more protective. The on-site cleanup will result in less source material for long-term transport off-site. While the RESRAD model assumes a certain amount of off-site transport of radionuclides due to erosion, the amount of radionuclides leaving the site would be very limited over time. Continued studies (such as those surrounding actinide migration) will address whether off-site migration poses a threat to human health and the environment.

Investigations as part of the Health Advisory Panel dose reconstruction studies attribute nearly all the radioactive contamination in the soils of eastern RFETS and immediately off-site to one wind event in January 1969. Since then, the activity levels have been decreasing.

Comment:

A site-specific, risk-based standard of not more than one additional lifetime (70 years) cancer risk per million exposed persons -- is an approach more consistent with the national trend regarding application of human health risk-based standards and more acceptable than the proposed dose-based approach.

Response:

The national trend for limiting radionuclide exposures is to use a dose-based approach. This trend follows recommendations from the International Commission on Radiological Protection, National Committee on Radiological Protection and Measurement, the Nuclear Regulatory Commission, DOE and EPA. A dose-based approach used in the action levels

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represents a higher risk than the one in a million excess cancer risk. However, the 15/85 mrem dose still falls within the acceptable CERCLA risk range for intended use of the site.

Comment:

It is not acceptable to add dirt to "dilute" the concentration.

Response:

The Soil Action Level Framework does not allow mixing clean soil with contaminated soil as part of a cleanup remedy to meet the action level.

Comment:

Promulgate the CDPHE radiation standard at Rocky Flats.

Response:

The CDPHE radiation standard was never meant to be used at Rocky Flats as a cleanup standard. The CDPHE standard applies only to uncontrolled off-site areas as a construction standard, and requires special techniques to be utilized during construction activities to minimize the potential for migration of plutonium. There is no legal or human health basis to use the standard on-site as a cleanup standard, as it would result in a dose and risk level less than required by CERCLA or recommended by the ICRP and the NCRP.

Comment:

Are action levels consistent with downstream water quality standards?

Response:

Cleanup actions will control and prevent the potential for releases into surface water. The regulatory agencies will have oversight authority of cleanup actions, and the communities and public will be asked to review cleanup proposals. The action levels by themselves do not ensure DOE's ability to comply with downstream water quality standards and points of compliance.

Surface water standards will be applied independently of the soil action levels. The site will be required to meet the standards. The Integrated Water Management Plan contains a variety of elements to ensure that Rocky Flats maintains control of its surface water quality and compliance with standards.

Actions required by the action levels, such as removals or stabilizations, will provide sufficient protection for surface water. Those actions will control the worst areas of radiological contamination. Even these areas, so far, have not impacted surface water above standards.

As recommended, ongoing studies of plutonium mobility and transport have been committed to by DOE. Groundwater modeling is being refined and hydrogeological conditions will continue to be studied by DOE and the regulatory agencies.

Comment:

How will the site reconcile the more stringent state standard with the proposed standard as it pertains to the 1985 landowners' lawsuit settlement?

Response:

The State Construction Standard for Plutonium does not apply to the DOE site and is not a cleanup standard. The State Standard, when exceeded, requires an evaluation of special construction techniques to be used to keep plutonium from becoming wind blown during construction activities. It does not require soil remediation.

The State was not a party to the 1985 lawsuit. The action that resulted from the lawsuit was decided by a court settlement, not by a regulatory enforcement. No reconciliation is needed between the Soil Action Levels and the 1985 lawsuit.

Comment:

What assurances are there to protect downstream cities from failed assumptions?

Response:

CERCLA provides for a regular review of remedies to assure they remain protective of human health and the environment. The proposed remedy of no action for off-site areas is based on existing conditions and could be changed in the future if a new contaminant release threatened human health or the environment. Also, see response to comment #6 regarding independent application of surface water standards.

Comment:

During all remediation activities, indicate measures to ensure maximum protection of the work force and the public.

Response:

The health and safety of workers is protected by DOE orders and requirements of the health and safety plan prepared by contractors and sub-contractors. The plan specifies the types, frequencies and locations of monitoring, along with required protective clothing and gear. In addition, the plan describes decontamination and emergency response for the actions to be performed.

Remediation activities, including treatment phases of cleanup, require public-reviewed and agency-approved decision documents that describe actions to mitigate the release of contaminants. The decision documents must also include monitoring plans that cover sampling locations, analytical suites, and sample frequencies to prove that the mitigating actions are working. The decision documents must also meet the requirements outlined in the Plan for Prevention of Contaminant Dispersion, developed by RFETS, CDPHE and EPA and finalized in 1992.

Decision documents at RFETS include Records of Decision, Interim Measures/Interim Remedial Actions, Closure Plans, and Proposed Action Memorandums.

In addition to the monitoring required for specific cleanup projects, CDPHE and the site maintain an ambient environmental monitoring program for the air and surface water at Rocky Flats.

Comment:

Delay most ER work, but initiate remediation immediately in areas where highly contaminated soils pose urgent risks through erosion to surface water, seepage to ground water or other pathways.

Response:

There is no clear evidence that contaminated soils at Rocky Flats will present a threat of significant migration in the near future. So, in effect, this comment calls for a delay of all ER work. The DOE, CDPHE and EPA believe that the removal of contaminated soils using the interim action level should proceed in order to minimize the threat of contaminate migration in surface water and ground water or possible re-suspension by wind.

Comment:

Addressing the highest priority risks at RFETS may cause additional soil contamination. So, ER work should be delayed until the highest risks are completed.

Response:

Plutonium stabilization and consolidation, and other activities such as building decontamination and decommissioning, will be conducted in a safe manner that will not cause additional environmental degradation. If minor environmental contamination does occur, it will be cleaned up.

Comment:

Clean up to average background when economically and technologically possible; any cleanup not to average background is considered "interim".

Response:

The DOE, EPA and CDPHE have not committed to cleanup to background. The reasons for this are:

1. CERCLA and RCRA, the laws that govern the cleanup of contaminated sites in this country, say that cleanups should be protective of public health and the environment, not that sites be cleaned up to background.

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2. Until those laws are changed to require cleanup to background, Congress will not appropriate money to clean Rocky Flats or the approximately 1,200 other Superfund sites in the U.S. to background.

3. The DOE, EPA and CDPHE have agreed that the interim action levels will be revisited at the time of the final cleanup decision for Rocky Flats.

4. The DOE, EPA and CDPHE have also agreed that the cleanup will be performed in a manner that will not preclude a more stringent cleanup at a later time.

Comment:

Although soil action levels are interim, there is no guarantee of additional cleanup after the interim levels have been met.

Response:

Additional cleanup beyond that needed to meet the interim action levels will be dependent upon:

1. An evaluation of the entire site at the completion of the interim actions to determine if residual contamination warrants further action.

2. Continuing evaluation of new cleanup standards and new research concerning the health effects of ionizing radiation.

Comment:

If the industrial area is never reused for commercial/industrial purposes, why shouldn't a 15 mRem residential standard be applied sitewide?

Response:

The Vision for Rocky Flats anticipates potential commercial reuse in part of the industrial area and open space use in the Buffer Zone. If the industrial area is not used for commercial purposes, the only use it is likely to see is open space. The interim action level for the industrial area would also be protective of open space use. Residential development of either the industrial area or the Buffer Zone is not considered to be a likely future use scenario.

Comment:

Tier I is a very conservative approach and should be the way to go.

Response:

The parties agree.

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Comment:

More stringent standards will paralyze site cleanup.

Response:

The parties agree.

Comment:

Cleanup to background is unrealistic, use the proposed national standards and get on with it.

Response:

The DOE, CDPHE and EPA believe that the interim soil action levels are protective of human health and the environment and, at the same time, allow the site to proceed expeditiously with environmental restoration.

Soil Action Levels
Meeting on Independent Review
September 15, 1997

GROUND RULES AND AGENDA

Meeting Objectives

- Come to Agreement on General Scope of Independent Review
- Come to Agreement on Ground Rules for Independent Review
- Come to Agreement on Candidates to Conduct Review

Ground Rules

- Respect Each Other's Opinion
- Statements/Questions Brief and to the Point
- No Personal Attacks
- speak when recognized
- dont interrupt

Agenda Outline

Introductions &
- Opening Remarks
  Jessie Roberson
  Jim Fiore from al alm's office
- EPA National Activities on SALs
  Tim Rehder - NAS is doing an independent review of 15/85 in soil
- Meeting Format
  Reed Hodgins
- Define Independent Review
  Set Parameters for Discussion

We have agreement that an independent review of the SAL is necessary

Colorado Department
of Public Health
and Environment

NOV - 6 1996

Dear Community Member:

The U.S. Department of Energy (DOE), Colorado Department of Public Health and Environment (CDPHE), and the U.S. Environmental Protection Agency (EPA) have prepared the attached responsiveness summary to address the comments and questions received on the action levels for radionuclides in soils. The responsiveness summary is available in the Rocky Flats reading rooms and from the agencies.

The DOE, CDPHE and EPA believe all comments and questions received through the formal comment period have been addressed in this responsiveness summary. The agencies will continue to address concerns in the most appropriate manner as they develop. Further, members of the community are encouraged to participate in future reviews of the action levels and in other matters of public concern at the Rocky Flats site.

DOE, CDPHE and EPA thank the community for its interest in the actions levels, for taking the time to comment on the agencies' proposals, and for ongoing participation in the public process.

Questions about this responsiveness summary may be directed to Steve Slaten (DOE) at 303-966-4839, Steve Tarlton (CDPHE) at 303-692-3013, or Tim Rehder (EPA) at 303-312-6293.

Sincerely,

Steve Slaten
U.S. Department of Energy

Steve Tarlton
Colorado Department of Public Health and Environment

Tim Rehder
U.S. Environmental Protection Agency

Enclosure

Seven Reasons for an Independent Review of the Rocky Flats Soil Action Levels
(there are more)

1) Despite well-nigh universal public opposition to what they advocated, on October 18, 1996, DOE, EPA, and CDPHE adopted the Action Levels for Radionuclides in the Soil at Rocky Flats they had all along proposed.

2) Because the Soil Action Levels specify how much plutonium and other radioactive material may remain in the soil at Rocky Flats, they provide the clearest definition of "cleanup" so far advanced by DOE and its regulators. It is expected that the "cleanup" standard established for soil will also apply to other "cleanup" activity, such as decontamination of buildings. But the agencies have defined "cleanup" in a way that is unacceptable to the affected public.

3) According to the adopted standard, under a situation of active controls at the site, radionuclides remaining in the soil at Rocky Flats may expose an office worker in the Rocky Flats industrial zone to no more than 15 millirem per year in excess of natural background radiation levels for at least 1000 years, or materials in the soil may expose a hypothetical future resident farming on the site to no more than 85 mrem/ year above background for the duration of the 1000 years. By contrast, in 1993 New York State adopted the following more stringent cleanup standard for its West Valley nuclear waste repository: "The effective dose equivalent to the maximally exposed individual of the general public, from radioactive material remaining at a site after cleanup, shall be as low as reasonably achievable and less than 10 mrem above that received from background levels of radiation in any one year."

4) In determining how much radioactive material could remain in the soil without exceeding the aforementioned doses, the government agencies fed data for seventy-odd variables into their computer program. Though the public repeatedly demanded that they use the most conservative figures at every point in their calculations, the agencies again and again used less-than-the-most-cautious numbers. The predictable result: inflated amounts of radioactive materials could remain in the soil.

5) The Soil Action Levels adopted for Rocky Flats allow in the buffer zone up to 651 picocuries of plutonium-239/240 per gram of soil plus up to 117 pCi of americium-241 per gram of soil – an amount of plutonium 17,132 times the average background level for plutonium of 0.038 pCi per gram of soil, of americium 10,935 times the average background level for americium of 0.0107 pCi per gram of soil. The Action Levels allow the site's industrial zone to contain plutonium-239/240 up to 14,789 times average background level and americium-241 up to 9,439 times average background level (562 pCi of plutonium-239/240 plus 101 pCi of americium-241 per gram of soil).

6) At Enewetok, where the U.S. conducted nuclear weapons tests, the AEC/ERDA decided that a concentration exceeding 40 pCi of plutonium per gram of soil was too unsafe to allow people to move back into the area.

7) A recent report of the Rocky Flats Actinide Migration Panel suggests that up to 90% of the plutonium in the Rocky Flats soil may be in a form soluble in water and thus that plutonium migration is likely to be far greater than assumed by those who drafted the Soil Action Levels. Downstream and downwind communities (and all residents of the Denver area are downwind some of the time) thus face a long history of potential exposure to plutonium particles with all the attendant negative health effects.

CONCLUSION: The foregoing clearly shows the wisdom of an early, independent review of the Rocky Flats Soil Action Levels.

LeRoy Moore, Ph.D.
Rocky Mountain Peace and Justice Center
September 10, 1997

DAVID E. SKAGGS
2ND DISTRICT, COLORADO

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UNITED STATES
HOUSE OF REPRESENTATIVES

COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON INTERIOR
SUBCOMMITTEE ON COMMERCE, JUSTICE, STATE AND THE JUDICIARY

PERMANENT SELECT COMMITTEE ON INTELLIGENCE

CHAIRMAN, DEMOCRATIC STUDY GROUP

June 10, 1997

The Honorable Federico F. Pena
Secretary
Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

Administrator Carol M. Browner
Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

Mr. Alvin L. Alm
Assistant Secretary for Environmental Management
Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

Dear Secretary Pena, Administrator Browner, and Mr. Alm:

I received a copy of the letter dated May 1, 1997, the Rocky Flats Citizens Advisory Board (CAB) sent to you regarding review of the Rocky Flats soil action levels. I support national review of the 15/85 standard as established for the Department of Energy's Rocky Flats site, including review of the RESRAD model.

As you know, Rocky Flats is very close to a major metropolitan area, and as cleanup proceeds, it's important to ensure that down-stream water supplies are protected. I've been advised that the 15/85 standard adopted by Rocky Flats protects these interests. I supported the interim standard based on that advice, with the understanding that these standards will be reviewed, as needed, including an annual review as provided in the Rocky Flats Cleanup Agreement.

Since the adoption of the soil action levels last October, the Environmental Protection Agency decided against publishing a proposed regulation, thereby undermining the opportunity to subject these standards to independent national review. As you know, the Rocky Flats soil action levels are based on that draft regulation.

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I now understand that the Nuclear Regulatory Commission (NRC) is preparing to publish a draft rule for soil cleanup levels. For this reason, it seems unnecessarily duplicative for both the National Academy of Sciences and the NRC to conduct a national review of the level of cleanup adequate to protect human health and the environment. So, I strongly support review of the RESRAD model by the National Academy of Sciences. I also support review of the 15/85 standard if the NRC significantly delays or decides against publishing its draft rule.

Thank you for considering my thoughts on this matter. If you have any questions, please call me, Stan Sloss in my Washington D.C. office, or David Abelson in my Colorado office.

Sincerely yours,

David Skaggs

David E. Skaggs

DES: dma

(2)

WESTMINSTER

May 16, 1997

The Honorable Federico Pena
Secretary of Energy
United States Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585

The Honorable Carol Browner
United States Environmental Protection Agency
Waterside Mall
401 M Street SW
Washington, D.C. 20460

Alvin L. Alm
Assistant Secretary for Environmental Management
United States Department of Energy
Forrestal Building
1000 Independence Avenue SW
Washington, D.C. 20585

City of Westminster
Office of the
Mayor

4800 West 92nd Avenue
Westminster, Colorado
80030

303-430-2400
FAX 303-430-1809
TDD 303-428-0648

Dear Secretary Pena, Administrator Browner, and Mr. Alm:

The City of Westminster is writing to support the request of the Rocky Flats Citizens Advisory Board (CAB) that both the United States Department of Energy (DOE) and the United States Environmental Protection Agency (EPA) initiate and fund a contract with the National Academy of Sciences to provide a review and set a national standard for radionuclides in soil. The EPA was in the process of promulgating such a national soil standard in 1996, but has since dropped its proposal. It is very important not only for our local community and adjacent communities, but the nation as a whole that a national standard that is protective of human health and the environment be studied and determined.

The DOE ruled on October 19, 1996, that a 15 millirem for industrial use and 85 millirem (651 Picocuries/gram) for residential was an appropriate cleanup standard for the Rocky Flats Environmental Technology Site (RFETS). This standard was subsequently adopted as an interim soil action level for the Rocky Flats Cleanup Agreement by the local Rocky Flats Field Office, the Colorado Department of Public Health and Environment, and the EPA. This interim standard is awaiting a final national determination of an appropriate protective dose level.

Local governments as well as stakeholders are not comfortable with the 85 millirem dose standard set in the buffer zone of the RFETS for residential use. The area where our City is located already has a higher background exposure from naturally occurring radiation and nuclear fallout. Additionally, the RESRAD model that was used to determine the soil action levels for Rocky Flats used breathing rates set for low altitude residents, rather than for a high altitude area such as ours in Colorado.

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May 16, 1997
Page 2

Dollars spent for this review by both the DOE and EPA will result in renewed confidence in the ability of both agencies to protect the health and welfare of citizens who live in the shadow of the former nuclear production facilities. We believe that it is important that this review be undertaken as soon as possible.

Your support in this endeavor will be greatly appreciated.

Sincerely,

Nancy Heil

Nancy M. Heil
Mayor

cc: United States Senator Wayne Allard
United States Senator Ben Nighthorse Campbell
United States Representative David Skaggs
United States Representative Diana DeGette
United States Representative Dan Schaefer

(4)

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FAX MEMORANDUM
JUNE 25, 1997

TO: **BOB TRUE**

FROM: **TIM HOLEMAN - BROOMFIELD ENVIRONMENTAL AND NATURAL RESOURCE ADVISOR**

RE: **RFCA ANNUAL REVIEW**

Broomfield has the following comments to submit to the RFCA parties as you conduct the annual review.

1. **Soil Action Levels**

We disagree with the 15/85 standard. In our comments on establishment of these standards, Broomfield states its belief that a more restrictive standard is appropriate. In light of recent findings by the Actinide Migration Panel, recent correspondence by the U.S. EPA and the abandonment of the EPA rulemaking, the RFCA annual review is a good time to reassess further scientific evaluation.

Broomfield continues to support the accelerated cleanup plan, but only done in a safe manner and with rigorous oversight. We believe the interim action level merits new attention from nationally recognized scientists. Specifically, the linkage between water quality and soil - and the further impact of erosion and wind - as stated by the Actinide panel, suggests the need for a coordinated and comprehensive re-review. We suggest that a working group of the RFCA parties, Kaiser-Hill, downstream communities, Jefferson County and nationally known experts be convened by DOE to scope out additional research and additional computer modeling.

2. **Intergovernmental Cooperation**

As implementation proceeds, Broomfield recommends that the parties find new ways to incorporate impacted communities more effectively in the consultative process. Certain cleanup and water quality issues require a higher standard of collaboration with impacted communities. Appendix two and five offer useful and important guidance on intergovernmental cooperation. Appendix Two overs useful rules of thumb for interaction which should also be applied in those instances when local goverment land use, water quality, community development and public health and safety obligations and authority will be impacted by a RFCA decision.

In addition, the standard operating procedure of the RFCA parties is to limit their formal discussions, scoping activities, training and overall implementation to the three parties alone. We encourage the parties to expand the scope of participation in some of

these activities because we believe it will improve public support and the quality of decisions.

3. Information Exchange

The ASAP plan must be accompanied by accelerated public interaction and information exchange. Broomfield recommends completion of the Rocky Flats WEB page as an additional central source for obtaining many of the cleanup decision-making documents. Because of the burdensome job of keeping pace with the distribution of draft and final documents, many such documents are not made available in a timely fashion for non-RFCA party review. In some cases, we are not even aware of the availability of key documents, including those commissioned by Kaiser-Hill to support its ASAP goals.

4. Technology Development

Innovative technologies are not specifically referenced in the RFCA. Kaiser-Hill has recently hired a technology development specialist. How will Kaiser-Hill's technology development program help to accelerate and improve RFCA implementation?

ROCKY FLATS CITIZENS ADVISORY BOARD

An Advisory Board to the U.S. Department of Energy

May 1, 1997

Secretary Federico Peña
U.S. Department of Energy
1000 Independence Ave. NW
Washington, D.C. 20585

Assistant Secretary Alvin Alm
U.S. Department of Energy
1000 Independence Ave. NW
Washington, D.C. 20585

Carol M. Browner, Administrator
U.S. Environmental Protection Agency
410 M Street, SW
Washington, D.C. 21460

Dear Mr. Peña, Mr. Alm, and Ms. Browner:

The members of the Rocky Flats Citizens Advisory Board (RFCAB) are writing to request that the Department of Energy (DOE) and the Environmental Protection Agency (EPA) contract with the National Academy of Sciences, or other organization that is independent, unbiased and scientifically based, to provide a review of the Soil Action Levels for radioactive materials contamination that were approved by DOE, the Colorado Department of Public Health and Environment (CDPHE), and the Environmental Protection Agency as part of the Rocky Flats Cleanup Agreement.

On October 19, 1997, Mr. Alm visited the Denver area and was present for a community meeting concerning Rocky Flats. This visit coincided with the Department's announcement accepting the controversial Soil Action Levels for use at the Rocky Flats Environmental Technology Site. During the meeting, numerous participants questioned the wisdom of this decision. At that time, Mr. Alm indicated that a review of these levels by the Academy might be appropriate. We are now asking DOE and EPA to initiate this important review by either the Academy or a similar organization.

The need for EPA's cooperation in the funding and development of this study stems from its withdrawal of proposed national radioactive materials in soil contamination standards earlier this year. The Rocky Flats Citizens Advisory Board, in its recommendations on the Soil Action Levels, stressed the need to have national standards in place before setting site-specific standards at Rocky Flats. The Soil Action Levels at Rocky Flats now set a precedent for the rest of the country. We do not feel this is the proper manner in which to set a national standard.

Rationale for contracting with the National Academy of Sciences or other organization includes the following important points:

- The Citizens Advisory Board is not convinced that the conclusions by local DOE, EPA and CDPHE that a plutonium in soil level of 651 pCi/g will produce exposure levels of 85 mrem/year in a residential land use scenario. The Board believes the 651 pCi/g action level set at Rocky Flats is too high in light of the following comparisons:

Plutonium in Colorado Soil (Average Background)	0.04 pCi/g
1975 Colorado State Soil Construction Guideline	0.9 pCi/g
1978 Soil Cleanup Standard for Enewetak Atoll	40 pCi/g

9035 Wadsworth Parkway Suite 2250 • Westminster, Colorado 80021 • 303-420-7855 • Fax 303-420-7579

(7.)

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- There needs to be more research into the use of the RESRAD model as a tool to predict soil concentration levels that produce exposures at various dose limits such as 15 or 85 mrem. We need to know whether the RESRAD model used to set the Soil Action Levels is accepted by the larger scientific community, not just by DOE scientists who might have a vested interest in the outcome.
- The broader question of what dose level is acceptable also needs to be examined. Given an already higher background exposure from naturally occurring sources and from nuclear fallout, the community downwind from Rocky Flats wants a broader investigation of what millirem level will provide protection from the effects of low level radiation.
- The National Academy of Sciences is a credible, independent scientific organization widely respected by the larger scientific and academic community. By its participation, the Academy will bring a national focus to the issue of setting standards for radioactive materials in soils. DOE and EPA may wish to consider other organizations meeting the same qualifications.

The Citizens Advisory Board realizes that the Department of Energy's budget has been cut significantly by Congress in recent years. However, we estimate the money paid to the Academy or other organization for this review will save the Department in the long run by avoiding litigation and other expenses trying to defend unacceptable soil cleanup standards. Our community does not accept these standards, nor will others where they might be applied in the future. The Department also will benefit through restored credibility in the Rocky Flats community.

Should DOE and EPA accept our recommendation, it is important that your agencies and the chosen review organization set up a process that allows for active stakeholder involvement in the design and conduct of the study. RFCAB would very much appreciate the opportunity to participate in this important process.

We thank you for your consideration of this request and look forward to your favorable response.

Sincerely,

Tom Marshall (TR)

Tom Marshall
Chair

cc: Jessie Roberson, DOE-RFFO
Jack McGraw, EPA Region VIII
Tom Looby, CDPHE
Governor Roy Romer
Senator Wayne Allard
Senator Ben Nighthorse Campbell
Representative Diana DeGette
Representative Dan Schaefer
Representative Bob Schaffer
Representative David Skaggs

(8)

June 18, 1997

Mr. Alvin Alm, Assistant Secretary of Energy for Environmental Management
Department of Energy, EM-1
1000 Independence Avenue, SW
Washington, DC 20585

Ms. Jessie Roberson, Manager
DOE Rocky Flats
P. O. Box 928
Golden, CO 80402-0928

Mr. Jack McGraw, Deputy Regional Administrator
EPA Region VIII
999 18th Street, Suite 600
Denver, CO 80202-2466

Mr. Tom Looby, Director, Office of the Environment
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80222-1530

Dear Mr. Alm, Ms. Roberson, Mr. McGraw, and Mr. Looby:

The signatories of this letter call for the appointment of an independent body to conduct a thorough review of the adequacy of the established action levels for radionuclides in soil at Rocky Flats.

CONSIDERATIONS

1) In August 1996, as a final step in the long process of creating the Rocky Flats Cleanup Agreement, the Department of Energy and its regulators at Rocky Flats (EPA and CDPHE) proposed action levels for radionuclides in the soil at Rocky Flats. Referred to as the 15/85 mrem/year standard, this proposal may be summarized as follows: Under a situation of active controls at the site (such as restricted access), radionuclides remaining in the soil at Rocky Flats may expose an office worker in the Rocky Flats industrial zone to no more than 15 millirem per year in excess of natural background radiation levels for at least 1000 years, or, after removal of active controls, materials in the soil may expose a hypothetical future resident farming on the site to no more than 85 mrem/year above background for the duration of the 1000 years. Remediation activity would be triggered when the quantity of radionuclides in the soil could result in a dose above said 15/85 mrem/year exposure for the targeted individuals.

2) In the extensive public comment that ensued, attention focused on the great uncertainties inherent in this proposal. Members of the public repeatedly urged the agencies to take the most cautious approach in every area of uncertainty. Time and again the agencies were faulted for taking a less-than-most-cautious approach on point after point, especially in their calculations to determine how much radioactive material could remain in the soil without exceeding the exposure being proposed as permissible. Members of the public were well aware that multitudes of small uncertainties added up cumulatively to uncertainties of a very large magnitude.

3) Affecting all public discussion of the proposal for Rocky Flats was the widely held belief that EPA expected soon to promulgate a national standard for radionuclides in

(9)

soil to apply to cleanup of all DOE nuclear weapons production facilities nationwide. Indeed, the 15/85 mrem/year for 1000 years number proposed for Rocky Flats came from *40CFR196, EPA Radiation Site Cleanup Regulation*, the text of the standard EPA expected to promulgate nationally. During the public comment on the Rocky Flats proposal, numerous citizens insisted that it would be unwise to adopt action levels for Rocky Flats before a national standard was established. Moreover, no national standard should be set without involving affected populations at all relevant DOE sites in a nationwide debate on the merits of EPA's proposed standard. To adopt action levels for Rocky Flats prior to such a debate and prior to adoption of a national standard would be premature and would set a bad precedent.

4) The public participation process on soil action levels for Rocky Flats showed near universal public opposition to the proposal advanced by DOE and its regulators. The Rocky Flats Citizens Advisory Board and numerous citizen groups recommended against adoption of soil action levels for Rocky Flats at the present time.

5) Despite this strong public opposition, on 18 October 1996 DOE, EPA, and CDPHE adopted the action levels they had all along proposed.

6) On the following day, 19 October, DOE Assistant Secretary Alvin Alm encountered a group of very disgruntled local citizens at a public meeting in Arvada, Colorado. Before the day was out he said an early review of the action level decision would be appropriate. Furthermore, Mr. Alm suggested that an independent body might conduct this review.

7) Meanwhile, *40CFR196*, EPA's proposed national action level standard for radionuclides in soil has been shelved. This underscores the premature nature of the 18 October 1996 decision taken regarding Rocky Flats.

8) The soil action levels adopted for Rocky Flats allow in the soil of the buffer zone a quantity of plutonium that emits up to 651 picocuries per gram of soil in the company of americium emitting up to 117 picocuries per gram of soil, since this amount purportedly would result in an exposure of no more than 85 mrem per year to a hypothetical resident in the buffer zone. For the industrial zone, the adopted action levels allow 562 picocuries of plutonium per gram of soil plus 101 picocuries of americium per gram of soil, because this amount purportedly would result in an exposure of no more than 15 mrem per year to an office worker in the industrial zone. At Enewetok, where the U.S. conducted nuclear weapons tests, the AEC/ERDA decided that concentrations exceeding 40 picocuries of plutonium per gram of soil were too unsafe to allow people to move back into the area.

9) Faced with having to clean up the Western New York Nuclear Services Center in West Valley, NY, in 1993 the New York State Department of Environmental Conservation promulgated the following standard: "The effective dose equivalent to the maximally exposed individual of the general public, from radioactive material remaining at a site after cleanup, shall be as low as reasonably achievable and less than 10 mrem above that received from background levels of radiation in any one year." In setting this standard New York State authorities rejected NRC and EPA recommendations that they adopt "a dose limit of 15 mrem/yr in excess of natural background radiation over the first 30 years."

CONCLUSION

The foregoing clearly shows the wisdom of an early, independent review of the Rocky Flats soil action levels. It remains to specify what should be included in the

review, who should do it, how the affected public should be involved, who should pay for the study, and what timetable should be followed.

A) WHAT SHOULD BE THE SCOPE OF THE REVIEW: The single most important question to be considered in the envisioned review is this: Does the adopted soil action level standard adequately protect people in and around the Rocky Flats site for as long as necessary? This question needs to be applied with unrelenting rigor to four aspects of the adopted Rocky Flats soil action level standard: (a) the adequacy of the dose level; (b) the appropriateness of the targeted exposed persons [office worker on site; future resident farming on site]: (c) the suitability of the 1000 year time frame; and (d) the viability of the calculations used to determine what amount of radioactive material in the soil corresponds to the designated permissible dose. Regarding the last of these, care needs to be taken to discover the most cautious approach at every point along the line, such as in low-dose exposure, relative biological effectiveness for plutonium, soil sampling methods, respirable fraction of soil, breathing rate, migration of radionuclides left in soil, computer modeling, provision for unusual events such as fire, floods, earthquakes, mechanical disturbance, surface slope. The review needs to show the cumulative total of all uncertainties. As an outgrowth of its findings, the review group should make clear recommendations regarding the Rocky Flats soil action levels. Should the action levels as adopted in October 1996 be retained, scrapped, adjusted in minor ways, revised in major respects? Finally, what is the judgment of the review body regarding whether soil action levels should be set for Rocky Flats prior to the establishment of a national standard?

B) WHO SHOULD PERFORM THE REVIEW: The review needs to be performed by a body independent of ties to any of the affected government agencies yet capable of commanding their respect. This body must also be able to command the respect of the knowing public. The review team could be either a standing body with scientific competence or a contractor with expertise in this area. To choose the review team and then to guide its work from inception till completion, we propose creation of a six-to-eight member oversight committee. The oversight committee would be composed of non-agency Denver-area residents selected by an independent citizen group such as the Rocky Flats Citizens Advisory Board and acceptable to the affected agencies.

C) HOW SHOULD THE PUBLIC BE INVOLVED: In addition to the guidance activity provided by the aforementioned oversight committee, ample opportunity must be provided for public participation and comment on the action levels as adopted as well as on any proposed modifications to the adopted levels. The first act of the review group, as soon as it gets itself constituted, should be to convene a public meeting to hear the concerns of any and all citizens who wish to express themselves (in effect, a scoping meeting). As the review work moves along, other meetings should be held to apprise the public of findings and to seek input, whether of approbation, suggestion, or criticism.

D) WHO SHOULD PAY THE COST: The three affected government agencies should bear the cost of the review team's work as an extension of the process of creating the Rocky Flats Cleanup Agreement. This would include expenses of the oversight committee.

E) WHAT TIMETABLE SHOULD BE FOLLOWED: The review team should conduct its work in an expeditious manner, striving not to exceed a two year time frame, with an earlier completion date if possible. DOE should structure its environmental restoration program at Rocky Flats such that the need to revisit environmental

restoration activities is minimized in the event that soil action levels are made more stringent.

We would appreciate a response to this proposal by July 2, 1997. Should you have any questions please feel free to contact LeRoy Moore of the Rocky Mountain Peace and Justice Center (303) 444-6981, Eugene DeMayo Rocky Flats Committee Chair of the Sierra Club (303) 938-9458, or Sam Cole of the Denver Chapter of Physicians for Social Responsibility (303) 298-8001.

Yours sincerely,

As Organizations
American Friends Service Committee, Colorado Chapter - Byron Plumley, Ph.D.
Boulder Green Alliance - Mark Ruzzin
Clean Water Action - Carmi Mcclean
Colorado Coalition for the Prevention of Nuclear War - Vivienne Perkins, Ph.D.
Colorado Peace Action - Andy Hanscom
Colorado People's Environmental and Economic Network - Beth Blissman
Environmental Defense Fund, Rocky Mountain Chapter - Dan Luecke
Mountain Forum for Peace - Arlene Strand
New Jewish Agenda -Mark Cohen
Physicians for Social Responsibility, Denver Chapter - Sam Cole
Pikes Peak Justice and Peace Commission - Mary Bauer, S.C.
Rocky Mountain Peace and Justice Center - LeRoy Moore, Ph.D.
Sierra Club, Rocky Flats Committee - Eugene DeMayo, O.D.
Sierra Club, Nuclear Waste Task Force - John Winchester
Solstice Institute - Ben Lipman
University of Colorado Environmental Center - Ed von Bleichert
Women's International League for Peace and Freedom, Boulder County

As Individuals (organizations listed for identification purposes only)
Joe Goldfield, P.E.
Nicholas Helburn, Ph.D. - Professor Emeritus, University of Colorado
Judith Mohling, Ph.D.
Janna Stieg
Dorothy Rupert - Colorado State Senator
Niels Schonbeck, Ph.D.- Metropolitan State College
Chet Tchozewski - Global Greengrants Fund
Dick Williams, Ph.D., and Gretchen Williams - residents of Broomfield

cc: Federico Pena, Secretary of Energy
Carol Browner, Director, Environmental Protection Agency
Governor Roy Romer
Senator Ben Nighthorse Campbell
Senator Wayne Allard
Representative David Skaggs
Representative Diana DeGette
Representative Dan Schaefer
Representative Bob Schaeffer
Rocky Flats Citizens Advisory Board
Rocky Flats Local Impacts Initiative

(12)

SAL Oversight Panel Preliminary Discussion 9/24/97

Name	Org	Phone / Fax
Ken Korkia	RFCAB	420-7855/7579
Steve Slaten	DOE	966-4839/ 3710
John Corsi	K-H	966-6526/ 4255
Tim Holeman	Broomfield	355-5492/ 5530
KATHY SCHNOOR	BROOMFIELD	438/6363/ 6234
HANK STOVALL	BROOMFIELD	466-5986/ 469-8554
EDD KRAY	COPHE	966-2115 /5449
LeRoy Moore	RMPJC	444-6981/ 444-6523
Mary Harlow	Westminster	430-2400 / 2174
Sam Mizion	Westminster	426-1202 / 429-5113
Dave Shelton	K-H	966-9877/ 966-5001
DR. NORMA MORIN	COPHE	692-2645
Jeremy Karpatkin	DOE	966-2080 / 966-6633

Next Lg Stkl group mtg Oct 14 11:30-1:00 at Westy

9/24/97

City of Broomfield

.PUBLIC WORKS –One DesCombes Drive Broomfield CO 80020

FACSIMILE TRANSMISSION

		PHONE	FAX
Hank Stovall	City of Broomfield	466-5986	469-8554
✓Ken Korkia	RFCAB	420-7855	420-7579
✓Steve Slaten	DOE	966-4839	966-3710
Jeremy Karpatkin	DOE	966-2080	966-6633
✓John Corsi	Kaiser Hill	966-6526	966-4255
→ Dave Shelton	Kaiser Hill	966-9877	966-5001
Edd Kray	CDPHE	966-2115	966-5449
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Mary Harlow	City of Westminster	430-2400	~~430-2174~~ 650 - 1643
Sam Dixion	City of Westminster	426-1202	429-5113
✓LeRoy Moore	RMPJC	444-6981	444-6523
Joe Goldfield	2 129 Elm St Denver 80220	321-7276	

FROM: **Diane Eismann**
PHONE: **(303) 438-6360**
FAX: **(303) 438-6234**
DATE: **October 31, 1997**

10 pages total (including cover sheet)

Call IMMEDIATELY if you did not receive all pages or if pages are illegible
Diane - 438-6360

41

SAL Oversight Panel Preliminary Discussion 9/24/97

Name	Org	Phone / Fax
Ken Korkia	RFCAB	420-7855/7579
Steve Slaten	DOE	966-4839/ 3710
John Corsi	K-H	966-6526/ 4255
Tim Holeman	Broomfield	355-5492/ 5530
KATHY SCHNOOR	BROOMFIELD	438/6363/ 6234
HANK STOVALL	BROOMFIELD	466-5986/ 469-8554
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LeRoy Moore	RMPJC	444-6981/ 444-6523
Mary Harlan	Westminster	430-2400 / 2174
Jim Nation	Westminster	426-1202 / 429-5113
Dave Shelton	K-H	966-9877/ 966-5001
NORMA McCAIN	COPHE	692-2645
Jeremy Karpatkin	DOE	966-2080 / 966-6633

Next SAL group mtg Oct 14 11:30-1:00 at Westy

F-A-X M-E-M-O-R-A-N-D-U-M
OCTOBER 31, 1997

TO: SOIL ACTION LEVEL AD-HOC GROUP

FROM: HANK STOVALL, BROOMFIELD COUNCIL MEMBER
(PHONE: 466-5986)

KATHY SCHNOOR, CITY OF BROOMFIELD
(PHONE: 438-6363)

RE: INDEPENDENT REVIEW OF RADIONUCLIDES IN SOILS

Per our October 10th meeting, interested members of the ad hoc group are invited to meet to discuss the next draft of the RSAL independent study project description. The meeting will be held on November 4, from 11:30 to 1:30 at Broomfield city hall. Pizza will be provided.

Attached is the next cut at a draft. Because numerous comments and suggestions have been received, we suggest that this document be viewed as the next step, not a final scope of work. Upon selection of the final members of the panel, this draft project description will provide the basis for further refinements by the panel and the development of a scope of work.

The section on "issues" is simply an attempt to characterize some of the concerns of the group and to highlight those issues a contractor must be sensitive to when submitting their proposal.

Also attached are comments from Victor Holm and Robert Kanick.

We will review this draft at the meeting and discuss next steps.
We look forward to your participation.

Review of Radionuclides in Soils CleanupAction Level Modeling
Draft Project Description
October 31, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels. The purposes of the evaluation are to independently analyze the soil cleanup action level (for transuranic elements in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted by acknowledged experts chosen by the panel.

An oversight panel will be formed and will consist of a combination of local government, federal and state regulators, and interested citizens. Over a twelve to fifteen month period - from the time of contract award - the group will, through CDPHE, contract with appropriate professional specialists to assess the appropriateness of the current RESRAD model and any alternative models.

The results of this investigation and evaluation will be shared with the RFCA principals to provide additional guidance in the ongoing refinement of soil action levels and the design of An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor.

2.0 Process and Administration

2.1 Project Administration

The Colorado Department of Public Health and Environment, through the office of the Rocky Flats Health Advisory Panel, will serve as the administrative conduit for allocation of the monies, administration of the contract and secretarial and organizational requirements of the oversight panel.

2.2 Establishment of the Oversight panel

The community-based oversight group shall be called the *Rocky Flats Radionuclide Soil Action Level Oversight Panel.* The Oversight Panel shall consist of the following members:

- Six members of local government. The members shall be self-selected by the consensus approval of interested local governments
- Two members of the public interest community. Members shall be self-selected by the consensus approval of interested public interest groups.
- Three representatives from the Technical community to include one representative from the HAP. Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.

- Two members of the general public. Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.
- One member of the RFCAB. Member shall be nominated by the CAB.

Ex-officio members: U.S. Department of Energy
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

An Interim adhoc group consisting of the following members will convene to guide creation of the full panel. The interim panel consists of the following representatives; City of Broomfield (Hank Stovall and Kathy Schnoor); City of Westminster(Sam Dixion and Mary Harlow); The Peace and Justice Center (LeRoy Moore); CAB (Victor Holm and Ken Korkia); Ex-officio (DOE - Steve Slaten; Kaiser-Hill - Dave Shelton and John Corsi); CDPHE - Norma Morin and Ed Kray).

2.3 Selection of a Contractor(s)

The oversight panel shall oversee the refinement of the Principal Investigation and Evaluations Questions (described below - 3.0) to be addressed by outside contractors. The panel shall utilize the expertise of a contractor or contractors to conduct the research needed to address the Principal Investigation and Evaluation Questions. An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor.

2.4 Process Management

All meetings shall be advertised and open to the public. The general public shall be encouraged to provide input to the panel. The panel shall strive for consensus, but when necessary, work by the process of majority vote. CDPHE will assist the panel in drafting the necessary documents and the RFP. In addition to administrative services, CDPHE will plan and promote meetings, serve as a liaison between the panel and the contractor and help disseminate information and results. DOE and Kaiser will work to ensure full access to all available data and relevant documentation. The Oversight panel will not be paid.

2.5 Relationship to the Actinide Panel

The RESRAD model limits its review to on-site impacts. The primary scope of the research will be the review of the RESRAD model, but many stakeholders believe that the impacts on off-site migration of radionuclides is of highest concern. Therefore, the ongoing research of the Actinide migration panel and site investigations into the short and long-term migration and fate of the actinides should be woven into the contractors activities as appropriate for addressing the Principal Questions. Because the Actinide Panel is addressing the potential for surface water migration off-site, the Oversight Panel should coordinate and incorporate the Actinide panel results into the timing of the activities of the contractor. It is expected that the contractor will meet at least once with the actinide migration investigators to share information

and coordinate efforts as appropriate and that the oversight panel will be kept fully appraised of the activities and results of the actinide migration investigators.

3.0 Principal Investigation and Evaluation Questions

Described below are the specific research questions to be answered by the project. These questions will provide guidance in the development of an RFP, and serve as the basis for negotiation of a final scope of work with the winning contractor(s).

a. What are the various models which can be applied to the study of the impacts of plutonium in Rocky Flats soils, including the RESRAD model? Analyze these models to determine which ones are best suited for the site-specific conditions of Rocky Flats.

b. What are the model input parameters and assumptions being applied for the existing models in use at Rocky Flats? Are these input parameters accurate and credible in simulating soil conditions and associated dose and risk. Each of these parameters should be commented upon as to distribution of possible values, from most conservative to least conservative (including a "reasonable" value), and the sensitivity of these parameters to the final result.

c. By applying the best available soils model and appropriate input parameters, as well as the methodology or methodologies as defined in the RFP, how will the model results impact the translation of dose and risk to soil action levels?

d. What processes/models have been used to determine cleanup levels at other plutonium contaminated sites and do these processes/models have application for use at Rocky Flats.

4.0 Special Issues

Below is a list of issues for the panel and the contractor to keep in mind as the final scope of work is negotiated. This list is a compilation of concerns and working assumptions expressed by stakeholders, DOE, Kaiser-Hill, CDPHE and EPA to provide a backdrop for the final design of the scope of work.

4.1 **Establishment of the RSAL**: Under the Rocky Flats Cleanup Agreement, the RFCA principals agreed upon the current RSAL to establish interim soil action levels for radionuclides (primary plutonium and americium) to be protective of people using Rocky Flats after site closure. The RSAL did not consider off-site migration. These RSAL's are to undergo periodic review as new information is available.

4.2 **Water Quality Standards:** The 0.15 pCi/L surface water standard for plutonium and americium were adopted by the Water Quality Control Commission to

protect all off-site use of water both during and after closure. The RFCA principals believe that the application of the RSALs to the site will result in actinides remaining in low concentrations in the soils. Stakeholders believe that the synergy of surface/groundwater to soils should be considered in the review of input parameters in the RESRAD or other models.

4.3 **Off-site Migration:** Recognizing the lead role of the actinide panel, stakeholders appreciate the potential for long-term off-site migration either through air, water or soil, and believe that a new or improved soils model should strive to integrate multi-media considerations. Some stakeholders believe that by applying ALARA principles, actinides can be minimized and immobilized in order to reduce off-site migration.

4.4 **Input Parameters:** To ensure that the contractor will quantitatively address the research questions and in order to minimize the subjective level of interpretation on how the input parameters should be applied, the scope of work and the contractor must strive to identify, at the onset, the method by which input parameters are applied or tested. Among others, choices include: Best estimate method, conservative method, bounding method, and probabilistic risk assessment method. Specifically, stakeholders are concerned that the 561pCi/gram action levels is high. Likewise, DOE is concerned that maximizing the conservatism of all input parameters could result in a model that lacks "reasonableness".

4.5 **Uniquie Site Specific Conditions:** The RFCA operates under the assumption that cleanup activities and cleanup levels will allow for a future land use scenario of ???? This assumption, as well as off-site land use developments, provide an important backdrop for the application of a preferred model. In addition, other issues impacting soils include: community acceptance of institutional controls; the prospect for deployment of innovative/cost effective soils remediation technologies; the opportunity for off-site disposal of soils and building rubble; and, the importance of buffer zone preservation and critical habitat. All these issues, many of which are in flux, should be recognized when judging the applicability of the RESRAD or other models at Rocky Flats and the adequacy or appropriateness of the model inputs.

4.6 **Quality Assurance:** Quality assurance is critical to ensure that the contractor results are credible, believable and consistent with established practices for analysis of radionuclides. The scope of work must ensure appropriate quality assurance and peer review protocals.

5.0 Timeline:

General Timeline: - 12 to 15 months from date of contract.

October to December, 1997	- Convening of oversight committee; refinement of scope of work and development and issuance of RFQ.
January, 1998	- Award of contract.
March to Dec, 1998	- Contractor performs scope of work with quarterly technical review meeting with the panel and the public.
Jan to March, 1999	- Final report (Panel review and peer review)

6.0 Estimated Cost:

$800,000 to $1,500,000	* Preliminary estimates by CDPHE

Robert J. Kanick
[redacted]

October 28, 1997

Tim Holeman Hank Stovall
[redacted]

Subject: Rocky Flats Soil Action Levels (SALs) Independent Review

Dear Gentlemen,

I wanted to express more fully the concern I expressed during the recent meeting concerning the independent review of the Rocky Flats soil action limits (SALs) because I feel that it is important that everyone involved be aware of this issue.

It has been my impression that people have three main concerns regarding the current interim SALs and/or the analysis used to generate them:

1. The applicability of the RESRAD model to the Rocky Flats situation.
2. The adequacy or appropriateness of the model inputs and, in particular, their conservatism.
3. The magnitude of the limits themselves (e.g. 561 pCi/gm just *seems* too high).

If defined thoroughly and thoughtfully in advance, this independent review should be able to address each of these concerns. However, to ensure this we must be careful not to fall into the common trap of having to interpret the results of such a study. With this I mean that we must define what we are seeking to know and, in fact, what we're willing to accept and get as broad an acceptance to this before the independent review is done. I believe this will require the technical consideration which I discuss below.

In my opinion, determining the applicability of the RESRAD model (item 1. above) or any other model should be a fairly straightforward and definitive task. A technically competent organization should be able to tell us, if not which model is best, which model or models are adequate and applicable to the task.

However, with regard to items 2. and 3. above, I believe that no additional study or independent review will be successful in satisfying these concerns unless we decide up front what kind of study we want done. I say this because it is not something that can be determined by an outside organization. An independent body can tell us the validity of models and inputs, but they cannot tell us how these inputs should be applied unless we give them adequate guidance. This is why I feel that it is imperative that as many technical people as possible are involved in the definition of this independent review. By way of the following descriptions, let me try to explain what I mean by this.

I am aware of four principal methods which can be employed to perform or critique such an analysis. Briefly, and in simple terms, these are:

Best Estimate Method:
This is just that, a best estimate of which SALs will yield the limiting doses. The inputs for such an analysis are chosen based on their highest likelihood or, very often, the mean value, with some

uncertainty applied. For example, if there were an even chance that the wind will be either 5 or 10 mph, such a study would assume a value of 7.5 mph plus some measurement uncertainty. Such an analysis is generally not used for this type of limit determination and probably wouldn't be acceptable to many people anyway.

Conservative Method:
This type of analysis requires more judgment of the inputs than best estimate for the level of conservatism must be defined. It involves choosing input values which will intentionally produce lower SALs. For example, if there is an even chance that the wind will be 5 or 10 mph, one would choose the 10 mph wind if it is known that it would cause higher doses and therefore lower the resulting SALs. As near as I can interpret from various reviews, the current SALs analysis was done with a *moderately* conservative methodology.

Bounding Method:
This type of analysis involves choosing input values which are at their absolute maximums or minimums so as to achieve the lowest possible resulting SALs. For example, if the wind is almost always 5 or 10 mph, but it is known to reach as high as 90 mph, this type of analysis would use the 90 mph value. The problem with this method is that it will likely yield limits which are BELOW background levels. The reason this happens is because the combination of all of the worst case inputs is almost completely unrealistic to assume. The people and organizations which are striving for this type of analysis must be made aware of the unreasonableness of this approach in its pure form.

Probabilistic Risk Assessment (PRA) Method:
This method combines the principles of the first two methods into a very technically defensible analysis. In this method, the model is run a large number of times (many thousands and sometimes millions of cases are not uncommon) and the inputs are allowed to vary randomly over a range of their known behavior just as they do in nature. For example, if the wind is known to be 5 mph for 15 days/month, 10 mph for 10 days/month, and 25 mph for 5 days/month, then the selection of this input over the course of the many thousands of cases will reflect this distribution. The result of this type of analysis is a distribution of SALs which can then be evaluated conservatively by selecting the limits given a standard statistical 95% or 99% confidence level. In other words, we can select the SALs which , with a high degree of probability, will ensure that the dose limits are not exceeded.

PRA is the methodology which is increasingly being adopted by the nuclear power industry to perform their safety analyses because it reflects the most realistic assessment of the risks posed by a given event. It is highly suited for setting the Rocky Flats SALs and, in my opinion, the best choice because if the inputs are defined appropriately, it takes the guess work and interpretation out of the results.

By these descriptions, I hope it becomes apparent to everyone involved that no independent organization can tell us which of these is what should be done when critiquing the SALs. Also, it is probable that we would choose a method different from what was used for the current SALs. In this case, it seems most efficient that we simply ask the chosen organization to perform a new calculation. Therefore, I believe that as many people as possible need to understand these methodological concepts before the review or recalculation to ensure that the results will address the widest range of concerns. If it is felt that this issue is still not clear, I would be happy to make a brief clarifying presentation to the working group.

Sincerely,

Bob Kanick

Bob Kanick

Victor's ideas on RSAL Group

Some questions we should discuss before we agree on the scope.

A. Do we want to consider a two tier system incorporating institutional controls.
   1. If we do have two tiers what should be the criteria.
      a. The entire buffer zone ?
      b. Only environmentally sensitive areas. e.g. Prebble mouse habitat.
      c. Cost of cleanup.
   2. Who decides on the criteria and when.

B. The water standard is set at one chance in a million for cancer if used for drinking water. Do we want to use the same risk for airborne dust off site.

Scope Items:

A. Survey of past examples of soil action levels used for cleanup.
   1. What uses was land to put to after cleanup.
   2. When and to what dose standard was the cleanup done.
   3. What particular soil conditions were present.
   4. What was the depth of contamination.

B. What computer programs or methods are available to translate dose into contamination levels.
   1. What are the advantages of each
   2. Where have they been used.
   3. Have they been throughly tested.

C. Input parameters
   1. Site specific parameters
   2. EPA specified parameters
   3. Use a risk based probability method to determine overall risk.

D. Off-site exposure
   1. Water
   2. Air

E. Q/A. How are the values to be measured, what spacing constitutes confidence. Lab checks.

E. Land use - institutional controls

F. Technology for soil cleanup

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6.0 Estimated Cost:

$800,000 to $1,500,000 * Preliminary estimates by CDPHE

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Message-ID: <971202121239_1807052451@mrin86.mail.aol.com>
To: kschnoor@compuserve.com
Subject: RFP Strawman

2.0 Scope of Study

2.1 The contractor will survey past examples of soil action levels adapted or projected for the cleanup of other sites. This study should concentrate on examples of soil contaminated with transuranic elements. Of particular interest is the reasoning that went into the setting of these standards and the subsequent history of the site including any cleanup. The survey does not need to be exhaustive. The study should concentrate on published material supplemented by interviews and correspondence. The study should compare the levels within the context of site-specific conditions, projected land use, and the then existing risk assessments and dose standard

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s. This portion of the study will not be used to recommend soil action levels at Rocky Flats; but will simply be used to place the calculated values in a national context.

2.2 The contractor will evaluate existing dose response models. Models that are inappropriate to the site conditions obsolete or which can not be readily validated should not be included. RESRAD should be included due to its use in determining the current action levels. A comparison of the different models using site-specific Rocky Flats data would be useful. It is possible that no one model will prove satisfactory for determining both the on site levels and the off site risk of exceeding the existing standards. The contractor will be responsible for selecting the most appropriate model for the site-specific conditions at Rocky Flats and justifying that decision. Whichever model or models is chosen should be thoroughly validated. It is not necessary that the contractor perform this validation; peer reviewed, published studies will suffice. In the event that RESRAD is not used for the on-site standard, RESRAD should be run in parallel with the chosen model as a comparison.

2.3 All of the input parameters to the model need to be examined. They should be placed into two groups. The first group are parameters that are easily confirmed, non-site specific or are specified by EPA or other regulatory authority. Each of these parameters should be commented upon and its sensitivity to the final result determined. If the investigators feels that the EPA specified value is not appropriate an alternative should

recommended. The second group of parameters are those that are site specific to Rocky Flats. The distribution of possible values and the sensitivity of these parameters to the final standard are one of the main objectives of the study. The contractor will be responsible for seeking out and independently confirming each of these parameters. Because of the sensitivity of some of these parameters to the final value, the analysis should go beyond simply determining the most likely value. A through study of the distribution of possible values should be performed. A probability risk assessment should then be performed. Using Monte Carlo techniques or other similar statistical methods a determination of the probability of exceeding a standard dose should made. The final Soil Action Level should be expressed in terms of a probability of not exceeded the established dose. As a check on the risk based numbers a separate bounding analysis should be performed using reasonable conservative values. The Soil Action Level should also be expressed in terms of cancer risk using the standard EPA radionuclide slope factors.

2.4 The previous study for determining soil action levels only examined on-site exposure scenarios. Since off-site air and water quality standards are more restrictive; it is possible these standards will control the cleanup. An Actinide Migration Study is currently underway. The final results of this study will not be ready in time to be used in this study. Some preliminary results will however be available. The contractor should study these and any other relevant data and determine what cleanup level will be reasonably protective of existing off-site standards. It is un

derstood
that this conclusion is tentative pending completion of the Actinide
Migration Study. If possible a time plot of surface water contamination for
a range of soil cleanup levels should be produced. It is possible that a
different level of cleanup may be required for different areas of the site.
Wind blown dust is another form of possible migration of contamination
off-site. A cleanup level that is protective to off-site residents should be
determined. The collection of new data, laboratory studies and new research
are beyond the scope of this study. The contractor should; however, identify
the data needs of the study as early as possible in order to facilitate the
collection and analysis of additional data needed for the study.

2.5 The current soil action levels make provisions for institutional
controls. As part of the study of dose response models it will be necessary
to model the target populations for the study. These target populations are
directly related to future land use scenarios. Broad community input of
future land uses is essential to the study. The contractor will be expected
to work with the community in defining these hypothetical persons.

2.6 The soil action levels adapted will be determined in part by the method
chosen for remediation. The contractor should survey soil cleanup
technologies that have been used or are under development. Special care
should be taken to study methods that are less invasive of the environment
than wholesale removal of the soil. These methods are thought to be both
more protective of human health during cleanup and more protective of a
fragile and valuable ecosystem. It is not envisioned that the scope of this

study will include research or testing of new technologies; nor, need the survey be exhaustive of all possible technologies. Recommendations of new methods that could be investigated would be helpful.

2.7 For the two or three most promising methods of cleanup the contractor should investigate how the soil action levels would be implemented. This study should include sample spacing and depth, sampling methods and quality assurance that the action levels are being met. Standards for laboratory analysis and field radionuclide determination should be specified.

10/14

SIGN UP SHEET

NAME	PHONE NUMBER	FAX	AFFILIATION
Tim Rehder	312-6293	3126067	U.S. EPA
KATHY SCHNOOR	438/6363	438/6234	BROOMFIELD
HANK STOVALL	466-5986	469-8554	BROOMFIELD
Ken Korkia	420-7855	420-7579	RFCAB
Steve Tarlton X	692-3423	782-4969	CDPHE
NORMIE MORIN	692.2645	782.0188	CDPHE
Tim Holeman	355-5492	355-5530	Broomfield
Tom Marshall	444-6981	444-6523	RFCAB
Dave Shelton	966-9877	966-5001	K-H
VICTOR HOLM X	989-9086	980-9076	RFCAB
BOB KANICK	444-0049	444-0072	RFCAB
EDD KRAY	966-2115	/5449	CDPHE
Jeremy Karpatkin	966-2080	6633	DOE/RFFO
Jessie Roberson X	9662025	6054	DOE/RFFO
Jeff Ciocco X	301-903-7459	3877	DOE HQ
Jim Fiore X	" " "	"	DOE HQ (tele)
Ray Greenberg X	" " "	"	DOE HQ (tele)
LeRoy Moore	303-444-6981	444-6523	RMPJC
Sam Dixon	426-1202	429-5113	City of Westminster
M. Harlow	430-2400/2174	650-1643	City of Westminster
John Corsi	966-6526/4288	966-4255	Kaiser-Hill
Joe Goldfield	321-7276	—	(retired engineer)

66

10/14/9

AGENDA

SOIL ACTION LEVEL AD-HOC MEETING

Westminster City Hall, Council Chambers
October 14, 11:30 A.M.- 1:00 P.M.

James Fiore, DOE HQ will join the meeting via speaker phone

INTRODUCTION Sam Dixion Mayor Pro-Tem, City of Westminster

Moderator for this session ~~Tim Holeman,~~ Hank Stovall, City Council ~~Consultant, City of Broomfield~~

TOPICS TO BE COVERED

Review of Membership and Establishment of the Panel

~~Project Management - CDPHE Dr Morin or ?~~

~~Project Description and Product Review~~

Review of the Project timeline

Availability of Funding for 1997 - DOE

Path Forward -

OTHER ISSUES Dianne - NAS review of NRC rule - can we input

SCHEDULE NEXT MEETING

6M

438-6234

Radionuclide Soil Action Level Modeling ~~and Plutonium~~ Oversight Panel
Draft Scope of Work
October 10, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels ~~conduct additional research on better ways to accurately measure the impact of plutonium in on-site and off-site soils.~~ The purposes of the evaluation ~~study~~ are to independently analyze the soil cleanup action level for transuranic elements in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted by acknowledged experts chosen by the panel. ~~to assess the soil cleanup levels that will prevent exceedances of the state water quality standard in the surface waters leaving the site.~~

An oversight group will be formed and will consist of a combination of local government, federal and state regulators, and interested citizens. Over a twelve to fifteen month period - from the time of contract award - the group will, through CDPHE, contract with appropriate professional specialists ~~experts in the area of plutonium migration modeling~~ to assess the appropriateness ~~effectiveness~~ of the current RESRAD model and any alternative models.

The results of this investigation and evaluation ~~research~~ will be shared with the RFCA principals to provide additional guidance in the ongoing refinement of soil action levels and the design of appropriate ER, D&D, groundwater and surface water management, monitoring and long-term stewardship strategies and programs.

2.0 Process and Administration

2.1 Project Administration

The Colorado Department of Public Health and Environment, through the office of the Rocky Flats Health Advisory Panel, will serve as the administrative conduit for allocation of the monies, administration of the contract and secretarial and organizational requirements of the oversight panel.

2.2 Establishment of the panel

The community-based oversight group shall be called the *Rocky Flats Radionuclide Soil Action Level Oversight Panel.* An Interim panel consisting of the following members will convene to guide creation of the full panel. The interim panel consists of the following representatives; City of Broomfield (Hank Stovall and Tim Holeman); City of Westminster

(Sam Dixion and Mary Harlow); The Peace and Justice Center (LeRoy Moore); CAB (Victor Holm and Ken Korkia); Ex-officio (DOE - Steve Slaten; Kaiser-Hill - Dave Shelton and John Corsi); CDPHE - Norma Morin and Ed Kray).

really emphasized that it's a public process - public concern need to feed into the process

2.3 Process Management

The Interim panel will solicit for two additional citizen members, resulting in a total membership of no more than 16. All members shall designate both a primary appointment and an alternate. All meetings shall be advertised and open to the public. The panel shall work by the process of majority vote. CDPHE will assist the panel in drafting the necessary documents, the RFP and final report. DOE and Kaiser will work to ensure full access to all available data and relevant documentation. The Oversight panel will not be paid.

2.4 Members of the Oversight Panel

One Representatives from each community and two members from the scientific public shall make up the panel.

The Oversight Panel shall consist of the following members: 1) Jefferson County; 2) City of Westminster; 3) City of Broomfield; 4) City of Arvada; 5) Town of Superior or Louisville; 6) City of Thornton or Northglenn; 7) City of Boulder or Boulder County; 8) One member of the CAB; 9) One member of the health Advisory Panel; 10) The Peace and Justice Center; 11) The Sierra Club; 12 & 13) Two members from the Public. 6

- not clear? whether or not CAB will sit on panel

Ex-officio members: U.S. Department of Energy
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

3.0 Scope of work

The oversight panel shall oversee the design of the evaluations to be performed by outside contractors ~~shall conduct research~~ and monitor and oversee seek to address the scope of work described below. The panel shall utilize the expertise of a contractor or contractors to conduct the research needed to address the scope of work. ~~The panel shall seek out the expertise of its members and the ex-officio members in conducting literature searches and review of existing documentation.~~

3.1 Principal Investigation and Evaluation ~~Research~~ Questions

a. What are the various models which can be applied to the study of the impacts of plutonium in Rocky Flats soils? Analyze these models to determine which ones are best suited for the site-specific conditions of Rocky Flats.

b. What are the model input parameters and assumptions being applied for the existing models in use at Rocky Flats? Are these input parameters accurate and credible in simulating soil conditions and associated dose and risk. Each of these parameters should be commented upon as to distribution of possible values, from most conservative to least conservative, and the sensitivity of these parameters to the final result.

c. By applying the best available soils model and appropriate input parameters, how will the model results impact the translation of dose and risk to soil action levels. ~~appropriateness of current interim soil action levels and safe dose and risk levels?~~

3.2 Special Issues

~~Suggested replacement of issues a, b, and c below.~~

The RSAL was developed to establish interim soil action levels for radionuclides (primary plutonium and americium) to be protective of people using Rocky Flats after site closure. The 0.15 pCi/L surface water standard for plutonium and americium were adopted to protect all off-site use of water both during and after closure. It is recognized that the application of the RSALs to the site will result in actinides remaining in low concentrations in the soils. But by applying ALARA principles these actinides should be minimized and immobilized in order to reduce off-site migration. The site has on-going investigations to better define the short- and long-term migration and fate of the actinides. It is expected that the experts convened under this contract to evaluate the RSALS will meet at least once with the actinide migration investigators to share information and coordinate efforts as appropriate and that the oversight panel will be kept fully appraised of the activities and results of the actinide migration investigators.

a. On-site versus off-site analysis: The RESRAD model limits its review to on-site impacts. The panel should determine the appropriateness of utilizing a separate modeling protocol for off-site impacts, including review of the Actinide panel findings. Analysis should include review of off-site migration/impacts over time/distance for various cleanup levels.

b. Surfacewater/groundwater versus soil migration: Current modeling should be reviewed to determine how to further integrate the migration potential of surface/groundwater.

c. Ongoing research of the Actinide migration panel: Because the Actinide Panel is specifically addressing the potential for surface water migration off-site, the Soil Panel should coordinate and incorporate the Actinide panel results into the timing of the activities of the contractor.

RFCA land use scenario needs to be incorp

dictate to the contractor the

d. Anticipated land uses: The panel should accurately portray anticipated cleanup levels considering potential future land use - both on and off-site - and the associated dose and risk levels (time and distance).

e. Impact of soil cleanup technologies: Additional literature searches of the range of soils cleanup technologies, in use or under development, and the associated costs and impacts, which could significantly impact the dose levels should be explored. The study scope is not intended to conduct in depth research or testing of technologies, although recommendation of possible useful methods that could be applied should be specified.

bring it up to

f. For comparative perspective, review of SAL's or their equivalent as adopted at other sites contaminated with radionuclides should be part of the evaluation.

4.0 Timeline:

General Timeline:	- 12 to 15 months from date of contract.
October to December, 1997	- Convening of oversight committee; refinement of scope of work and development and issuance of RFQ.
January, 1998	- Award of contract.
February to Dec, 1998	- Contractor performs scope of work with quarterly technical review meeting with the panel and the public.
Jan to March, 1999	- Final report (Panel review and peer review)

5.0 Estimated Cost:

$800,000 to $1,500,000	* Preliminary estimates by CDPHE

22nd or 29th

City of Broomfield
One DesCombes Drive • P.O. Box 1415 • Broomfield, Colorado 80020

SHEET NO. ..... OF .....
JOB NO. RF SAL
BY KS
DATE 10/14/97 TIME 11:30 AM

Mary Harlow R.F. Coord. City of Westminster

Introductions:

phone connection: Jim Fiore, DOE HQ; Ray Greenberg DOE HQ

Panel Membership?
- many on local govt?
- CAB wants a placeholder, but may not actually hold a seat on the panel
- need for technical expertise on the panel?
- need policy people with good technical understanding

Cost?

Sam - concerned about ballooning costs - keep costs down
Normie - 1st. $800,000 - $1,500,000 ouch!
RFP process 6-8 wks

Time Frame?

- need to be completed in less than 12 mo. so decisions can be made in planning for 903 pc

Dianne,
Will a single contractor be able to perform the services? Do you need varied expertise
Values can be embodied in the RFP if you spend enough time

B06
72 CAB

SHEET NO. ..... OF .....

JOB NO. .....

BY .....

DATE ..... TIME .....

City of Broomfield

One DesCombes Drive • P.O. Box 1415 • Broomfield, Colorado 80020

Proposed Additional Section in Scope of Work:

3.1 Principal Investigation & Evaluation Questions

Quality Assurance — May be a Separate Issue
- different set of people to do this
- need a different mechanism to carry this out
- need to keep the books on this project

Independent Verification

Board needs to define its public participation process

Board Members
- up to 6 seats local govt
- " 2 seats activists
- " 2 seats general public
- " 2 seats technical experts
- " 1 seat from CAB

(Cindy, Tim, Kathy, Dan)

- advertise for nominations in each catagories
- each seat needs an alternate

- CAB newsletter
- Closure
- RFLII

— who will things go to

M3

– maybe need a different mechanism

3.1 Principal Investigation and Evaluation Questions

d. Quality Assurance - In order to ensure that a soil action level is safely, reliably and strictly implemented and adhered to, a quality assurance audit of the total soil remediation process and quality assurance protocols shall be reviewed for completeness.

F-A-X M-E-M-O-R-A-N-D-U-M
OCTOBER 10, 1997
(5 pages, including cover)

TO: **SOIL ACTION LEVEL AD-HOC GROUP**
JOE GOLDFIELD 321-7276

FROM: **HANK STOVALL, BROOMFIELD COUNCIL MEMBER**
(PHONE: 466-5986)

TIM HOLEMAN, BROOMFIELD ADVISOR
(PHONE: 355-5492; FAX: 355-5530)

RE: **INDEPENDENT REVIEW OF SOILS MODELING PROCESS AND SCOPE OF WORK**

The next meeting of the ad-hoc group is scheduled for Tuesday, October 14th, 11:30 A.M., WESTMINSTER CITY HALL.

Attached is a draft outline of the process and scope of work for conducting an independent review of radionuclides in soils models in use at Rocky Flats. This draft is based upon a September 24th meeting of an smaller sub-committee of community representatives. The document currently reflects suggested edits by various members of the group.

This draft will provide the basis for our discussion on October 14th. We look forward to your participation.

Nov. 4, 1997 – SAL Review Groups

NAME	ORGANIZATION
T. Stovall	CITY OF BROOMFIELD
Jon Marshall X	RFCAB
Ken Korkia	CAB
Bob Kanick X	RFCAB
Mary Harlow	City of Westminster
Sam Negron	"
Kathy Schnoor	CITY OF BROOMFIELD
John Corsi	Kaiser-Hill
Steve Slaten	DOE
Dave Shelton	K-H
Remy Harpenau	DOE/RFFO
Edd Kray	CDPHE
Jackie Berardini X	CDPHE
LeRoy Moore	RMPJC
Tim Holeman	Broomfield
Tim Rehder X	EPA
Joe Goldfield	CAB-SNM

[redacted]

KS

City of Broomfield

PUBLIC WORKS –One DesCombes Drive Broomfield CO 80020

FACSIMILE TRANSMISSION

		PHONE	FAX
Hank Stovall	City of Broomfield	466-5986	469-8554
Ken Korkia	RFCAB	420-7855	420-7579
Steve Slaten	DOE	966-4839	966-3710
Jeremy Karpatkin	DOE	966-2080	966-6633
John Corsi	Kaiser Hill	966-6526	966-4255
Dave Shelton	Kaiser Hill	966-9877	966-5001
Edd Kray	CDPHE	966-2115	966-5449
Dr. Norma Morin	CDPHE	692-2645	782-0188
Mary Harlow	City of Westminster	430-2400 x 274	~~430-2174~~
Sam Dixion	City of Westminster	426-1202	429-5113
LeRoy Moore	RMPJC	444-6981	444-6523
Joe Goldfield		321-7276	

FROM: **Diane Eismann**
PHONE: **(303) 438-6360**
FAX: **(303) 438-6234**
DATE: **October 31, 1997**

10 pages total (including cover sheet)

Call IMMEDIATELY if you did not receive all pages or if pages are illegible
Diane - 438-6360

78

F-A-X M-E-M-O-R-A-N-D-U-M
OCTOBER 31, 1997

TO: SOIL ACTION LEVEL AD-HOC GROUP

FROM: HANK STOVALL, BROOMFIELD COUNCIL MEMBER
(PHONE: 466-5986)

KATHY SCHNOOR, CITY OF BROOMFIELD
(PHONE: 438-6363)

RE: INDEPENDENT REVIEW OF RADIONUCLIDES IN SOILS

Per our October 10th meeting, interested members of the ad hoc group are invited to meet to discuss the next draft of the RSAL independent study project description. The meeting will be held on November 4, from 11:30 to 1:30 at Broomfield city hall. Pizza will be provided.

Attached is the next cut at a draft. Because numerous comments and suggestions have been received, we suggest that this document be viewed as the next step, not a final scope of work. Upon selection of the final members of the panel, this draft project description will provide the basis for further refinements by the panel and the development of a scope of work.

The section on "issues" is simply an attempt to characterize some of the concerns of the group and to highlight those issues a contractor must be sensitive to when submitting their proposal.

Also attached are comments from Victor Holm and Robert Kanick.

We will review this draft at the meeting and discuss next steps. We look forward to your participation.

Review of Radionuclides in Soils CleanupAction Level Modeling
Draft Project Description
October 31, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels. The purposes of the evaluation are to independently analyze the soil cleanup action level for transuranic elements in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted by acknowledged experts chosen by the panel.

An oversight panel will be formed and will consist of a combination of local government, federal and state regulators, and interested citizens. Over a twelve to fifteen month period - from the time of contract award - the group will, through CDPHE, contract with appropriate professional specialists to assess the appropriateness of the current RESRAD model and any alternative models.

The results of this investigation and evaluation will be shared with the RFCA principals to provide additional guidance in the ongoing refinement of soil action levels and the design of An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor.

2.0 Process and Administration

2.1 Project Administration

The Colorado Department of Public Health and Environment, through the office of the Rocky Flats Health Advisory Panel, will serve as the administrative conduit for allocation of the monies, administration of the contract and secretarial and organizational requirements of the oversight panel.

2.2 Establishment of the Oversight panel

The community-based oversight group shall be called the *Rocky Flats Radionuclide Soil Action Level Oversight Panel.* The Oversight Panel shall consist of the following members:

- Six members of local government. The members shall be self-selected by the consensus approval of interested local governments
- Two members of the public interest community. Members shall be self-selected by the consensus approval of interested public interest groups.
- Three representatives from the Technical community to include one representative from the HAP. Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.

- Two members of the general public. Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.
- One member of the RFCAB. Member shall be nominated by the CAB.

Ex-officio members: U.S. Department of Energy
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

An Interim adhoc group consisting of the following members will convene to guide creation of the full panel. The interim panel consists of the following representatives; City of Broomfield (Hank Stovall and Kathy Schnoor); City of Westminster(Sam Dixion and Mary Harlow); The Peace and Justice Center (LeRoy Moore); CAB (~~Victor Holm~~ and Ken Korkia); Ex-officio (DOE - Steve Slaten; Kaiser-Hill - Dave Shelton and John Corsi); CDPHE - Norma Morin and Ed Kray).

2.3 Selection of a Contractor(s)

The oversight panel shall oversee the refinement of the Principal Investigation and Evaluations Questions (described below - 3.0) to be addressed by outside contractors. The panel shall utilize the expertise of a contractor or contractors to conduct the research needed to address the Principal Investigation and Evaluation Questions. An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning ~~the~~ contractor.

2.4 Process Management

All meetings shall be advertised and open to the public. The general public shall be encouraged to provide input to the panel. The panel shall strive for consensus, but when necessary, work by the process of majority vote. CDPHE will assist the panel in drafting the necessary documents and the RFP. In addition to administrative services, CDPHE will plan ~~and promote~~ meetings, serve as a liaison between the panel and the contractor and help disseminate information and results. DOE and Kaiser will work to ensure full access to all available data and relevant documentation. The Oversight panel will not be paid.

2.5 Relationship to the Actinide Panel

The RESRAD model limits its review to on-site impacts. The primary scope of the research will be the review of the RESRAD model, but many stakeholders believe that the impacts on off-site migration of radionuclides is of highest concern. Therefore, the ongoing research of the Actinide migration panel and site investigations into the short and long-term migration and fate of the actinides should be woven into the contractors activities as appropriate for addressing the Principal Questions. Because the Actinide Panel is addressing the potential for surface water migration off-site, the Oversight Panel should coordinate and incorporate the Actinide panel results into the timing of the activities of the contractor. It is expected that the contractor will meet at least once with the actinide migration investigators to share information

and coordinate efforts as appropriate and that the oversight panel will be kept fully appraised of the activities and results of the actinide migration investigators.

3.0 Principal Investigation and Evaluation Questions

Described below are the specific research questions to be answered by the project. These questions will provide guidance in the development of an RFP, and serve as the basis for negotiation of a final scope of work with the winning contractor(s).

a. What are the various models which can be applied to the study of the impacts of ~~plutonium~~ in Rocky Flats soils, including the RESRAD model? Analyze these models to determine which ones are best suited for the site-specific conditions of Rocky Flats.

b. What are the model input parameters and assumptions being applied for the existing models in use at Rocky Flats? Are these input parameters accurate and credible in simulating soil conditions and associated dose and risk. Each of these parameters should be commented upon as to distribution of possible values, from most conservative to least conservative (including a "reasonable" value), and the sensitivity of these parameters to the final result.

c. By applying the best available soils model and appropriate input parameters, as well as the methodology or methodologies as defined in the RFP, how will the model results impact the translation of dose and risk to soil action levels?

d. What ~~processes/models have been used to determine~~ cleanup levels at other ~~plutonium~~ contaminated sites and do these processes/models have application for use at Rocky Flats.

4.0 Special Issues

Below is a list of issues for the panel and the contractor to keep in mind as the final scope of work is negotiated. This list is a compilation of concerns and working assumptions expressed by stakeholders, DOE, Kaiser-Hill, CDPHE and EPA to provide a backdrop for the final design of the scope of work.

4.1 Establishment of the RSAL: Under the Rocky Flats Cleanup Agreement, the RFCA principals agreed upon the current RSAL to establish interim soil action levels for radionuclides (primary plutonium and americium) to be protective of people using Rocky Flats after site closure. The RSAL did not consider off-site migration. These RSAL's are to undergo periodic review as new information is available.

4.2 Water Quality Standards: The 0.15 pCi/L surface water standard for plutonium and americium were adopted by the Water Quality Control Commission to

protect all off-site use of water both during and after closure. The RFCA principals believe that the application of the RSALs to the site will result in actinides remaining in low concentrations in the soils. Stakeholders believe that the synergy of surface/groundwater to soils should be considered in the review of input parameters in the RESRAD or other models.

4.3 **Off-site Migration:** Recognizing the lead role of the actinide panel, stakeholders appreciate the potential for long-term off-site migration either through air, water or soil, and believe that a new or improved soils model should strive to integrate multi-media considerations. Some stakeholders believe that by applying ALARA principles, actinides can be minimized and immobilized in order to reduce off-site migration.

4.4 **Input Parameters:** To ensure that the contractor will quantitatively address the research questions and in order to minimize the subjective level of interpretation on how the input parameters should be applied, the scope of work and the contractor must strive to identify, at the onset, the method by which input parameters are applied or tested. Among others, choices include: Best estimate method, conservative method, bounding method, and probabilistic risk assessment method. Specifically, stakeholders are concerned that the 561pCi/gram action levels is high. Likewise, DOE is concerned that maximizing the conservatism of all input parameters could result in a model that lacks "reasonableness".

4.5 **Uniquie Site Specific Conditions:** The RFCA operates under the assumption that cleanup activities and cleanup levels will allow for a future land use scenario of ???? This assumption, as well as off-site land use developments, provide an important backdrop for the application of a preferred model. In addition, other issues impacting soils include: community acceptance of institutional controls; the prospect for deployment of innovative/cost effective soils remediation technologies; the opportunity for off-site disposal of soils and building rubble; and, the importance of buffer zone preservation and critical habitat. All these issues, many of which are in flux, should be recognized when judging the applicability of the RESRAD or other models at Rocky Flats and the adequacy or appropriateness of the model inputs.

4.6 **Quality Assurance:** Quality assurance is critical to ensure that the contractor results are credible, believable and consistent with established practices for analysis of radionuclides. The scope of work must ensure appropriate quality assurance and peer review protocals.

5.0 Timeline:

General Timeline: - 12 to 15 months from date of contract.

October to December, 1997	- Convening of oversight committee; refinement of scope of work and development and issuance of RFQ.
January, 1998	- Award of contract.
March to Dec, 1998	- Contractor performs scope of work with quarterly technical review meeting with the panel and the public.
Jan to March, 1999	- Final report (Panel review and peer review)

6.0 Estimated Cost:

$800,000 ~~to $1,500,000~~ * Preliminary estimates by CDPHE

Robert J. Kanick
1333 Pine St. #1
Boulder, CO 80302-4840

October 28, 1997

Tim Holeman
2282 Bellaire
Denver, CO 80207

Hank Stovall
1115 Ash St.
Broomfield, CO 80020

Subject: Rocky Flats Soil Action Levels (SALs) Independent Review

Dear Gentlemen,

I wanted to express more fully the concern I expressed during the recent meeting concerning the independent review of the Rocky Flats soil action limits (SALs) because I feel that it is important that everyone involved be aware of this issue.

It has been my impression that people have three main concerns regarding the current interim SALs and/or the analysis used to generate them:

1. The applicability of the RESRAD model to the Rocky Flats situation.
2. The adequacy or appropriateness of the model inputs and, in particular, their conservatism.
3. The magnitude of the limits themselves (e.g. 561 pCi/gm just *seems* too high).

If defined thoroughly and thoughtfully in advance, this independent review should be able to address each of these concerns. However, to ensure this we must be careful not to fall into the common trap of having to interpret the results of such a study. With this I mean that we must define what we are seeking to know and, in fact, what we're willing to accept and get as broad an acceptance to this before the independent review is done. I believe this will require the technical consideration which I discuss below.

In my opinion, determining the applicability of the RESRAD model (item 1. above) or any other model should be a fairly straightforward and definitive task. A technically competent organization should be able to tell us, if not which model is best, which model or models are adequate and applicable to the task.

However, with regard to items 2. and 3. above, I believe that no additional study or independent review will be successful in satisfying these concerns unless we decide up front what kind of study we want done. I say this because it is not something that can be determined by an outside organization. An independent body can tell us the validity of models and inputs, but they cannot tell us how these inputs should be applied unless we give them adequate guidance. This is why I feel that it is imperative that as many technical people as possible are involved in the definition of this independent review. By way of the following descriptions, let me try to explain what I mean by this.

I am aware of four principal methods which can be employed to perform or critique such an analysis. Briefly, and in simple terms, these are:

Best Estimate Method:
This is just that, a best estimate of which SALs will yield the limiting doses. The inputs for such an analysis are chosen based on their highest likelihood or, very often, the mean value, with some

85

uncertainty applied. For example, if there were an even chance that the wind will be either 5 or 10 mph, such a study would assume a value of 7.5 mph plus some measurement uncertainty. Such an analysis is generally not used for this type of limit determination and probably wouldn't be acceptable to many people anyway.

Conservative Method:
This type of analysis requires more judgment of the inputs than best estimate for the level of conservatism must be defined. It involves choosing input values which will intentionally produce lower SALs. For example, if there is an even chance that the wind will be 5 or 10 mph, one would choose the 10 mph wind if it is known that it would cause higher doses and therefore lower the resulting SALs. As near as I can interpret from various reviews, the current SALs analysis was done with a *moderately* conservative methodology.

Bounding Method:
This type of analysis involves choosing input values which are at their absolute maximums or minimums so as to achieve the lowest possible resulting SALs. For example, if the wind is almost always 5 or 10 mph, but it is known to reach as high as 90 mph, this type of analysis would use the 90 mph value. The problem with this method is that it will likely yield limits which are BELOW background levels. The reason this happens is because the combination of all of the worst case inputs is almost completely unrealistic to assume. The people and organizations which are striving for this type of analysis must be made aware of the unreasonableness of this approach in its pure form.

Probabilistic Risk Assessment (PRA) Method:
This method combines the principles of the first two methods into a very technically defensible analysis. In this method, the model is run a large number of times (many thousands and sometimes millions of cases are not uncommon) and the inputs are allowed to vary randomly over a range of their known behavior just as they do in nature. For example, if the wind is known to be 5 mph for 15 days/month, 10 mph for 10 days/month, and 25 mph for 5 days/month, then the selection of this input over the course of the many thousands of cases will reflect this distribution. The result of this type of analysis is a distribution of SALs which can then be evaluated conservatively by selecting the limits given a standard statistical 95% or 99% confidence level. In other words, we can select the SALs which, with a high degree of probability, will ensure that the dose limits are not exceeded.

PRA is the methodology which is increasingly being adopted by the nuclear power industry to perform their safety analyses because it reflects the most realistic assessment of the risks posed by a given event. It is highly suited for setting the Rocky Flats SALs and, in my opinion, the best choice because if the inputs are defined appropriately, it takes the guess work and interpretation out of the results.

By these descriptions, I hope it becomes apparent to everyone involved that no independent organization can tell us which of these is what should be done when critiquing the SALs. Also, it is probable that we would choose a method different from what was used for the current SALs. In this case, it seems most efficient that we simply ask the chosen organization to perform a new calculation. Therefore, I believe that as many people as possible need to understand these methodological concepts before the review or recalculation to ensure that the results will address the widest range of concerns. If it is felt that this issue is still not clear, I would be happy to make a brief clarifying presentation to the working group.

Sincerely,

Bob Kanick

Bob Kanick

Victor's ideas on RSAL Group

Some questions we should discuss before we agree on the scope.

A. Do we want to consider a two tier system incorporating institutional controls.
   1. If we do have two tiers what should be the criteria.
      a. The entire buffer zone ?
      b. Only environmentally sensitive areas. e.g. Prebble mouse habitat.
      c. Cost of cleanup.
   2. Who decides on the criteria and when.

B. The water standard is set at one chance in a million for cancer if used for drinking water. Do we want to use the same risk for airborne dust off site.

Scope Items:

A. Survey of past examples of soil action levels used for cleanup.
   1. What uses was land to put to after cleanup.
   2. When and to what dose standard was the cleanup done.
   3. What particular soil conditions were present.
   4. What was the depth of contamination.

B. What computer programs or methods are available to translate dose into contamination levels.
   1. What are the advantages of each
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C. Input parameters
   1. Site specific parameters
   2. EPA specified parameters
   3. Use a risk based probability method to determine overall risk.

D. Off-site exposure
   1. Water
   2. Air

E. Q/A. How are the values to be measured, what spacing constitutes confidence. Lab checks.

E. Land use - institutional controls

F. Technology for soil cleanup

Robert J. Kanick
[redacted]

October 28, 1997

Tim Holeman Hank Stovall
[redacted]

Subject: Rocky Flats Soil Action Levels (SALs) Independent Review

Dear Gentlemen,

I wanted to express more fully the concern I expressed during the recent meeting concerning the independent review of the Rocky Flats soil action limits (SALs) because I feel that it is important that everyone involved be aware of this issue.

It has been my impression that people have three main concerns regarding the current interim SALs and/or the analysis used to generate them:

1. The applicability of the RESRAD model to the Rocky Flats situation.
2. The adequacy or appropriateness of the model inputs and, in particular, their conservatism.
3. The magnitude of the limits themselves (e.g. 561 pCi/gm just *seems* too high).

If defined thoroughly and thoughtfully in advance, this independent review should be able to address each of these concerns. However, to ensure this we must be careful not to fall into the common trap of having to interpret the results of such a study. With this I mean that we must define what we are seeking to know and, in fact, what we're willing to accept and get as broad an acceptance to this before the independent review is done. I believe this will require the technical consideration which I discuss below.

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However, with regard to items 2. and 3. above, I believe that no additional study or independent review will be successful in satisfying these concerns unless we decide <u>up front</u> what kind of study we want done. I say this because it is not something that can be determined by an outside organization. An independent body can tell us the validity of models and inputs, but they cannot tell us how these inputs should be applied unless we give them adequate guidance. This is why I feel that it is imperative that as many technical people as possible are involved in the definition of this independent review. By way of the following descriptions, let me try to explain what I mean by this.

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Hank/Kathy Schroer

uncertainty applied. For example, if there were an even chance that the wind will be either 5 or 10 mph, such a study would assume a value of 7.5 mph plus some measurement uncertainty. Such an analysis is generally not used for this type of limit determination and probably wouldn't be acceptable to many people anyway.

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C. Input parameters
   1. Site specific parameters
   2. EPA specified parameters
   3. Use a risk based probability method to determine overall risk.

D. Off-site exposure
   1. Water
   2. Air

E. Q/A. How are the values to be measured, what spacing constitutes confidence. Lab checks.

E. Land use - institutional controls

F. Technology for soil cleanup

Cost Estimate

Scope items:		1900 hrs	
A. Study of other instances of soil action levels.		100 hrs	
B. Study other dose response models		300 hrs	
Survey other models	50 hrs		
Compare these with RESRAD	150 hrs		
Validate the model chosen	100 hrs		
C. Input parameters		600 hrs	
Site specific parameters	350 hrs		
EPA set parameters	150 hrs		
Sensitivities	100 hrs		
D. Off-site migration		400 hrs	
Study of the problem	200 hrs		
confirmation and peer review	100 hrs		
dose response modeling	100 hrs		
E. Quality Assurance		200 hrs	
E. Land use		100 hrs	
F. Cleanup technologies		200 hrs	
Other items:		600 hrs	
Meetings with panel			
4 @ 50 hours each	200 hrs		
Progress reports	100 hrs		
Final report	200 hrs		
Other	100 hrs		
Total Hours		2500 hrs	
Cost @ $125			$310,000
Expenses			$100,000
CDPHE overhead			$ 90,000
Total			$490,000

TO: Adhoc Committee Members

FROM: Sam Dixion, Mayor Pro Tem, City of Westminster
Mary Harlow, Rocky Flats Coordinator, City of Westminster

SUBJECT: City of Westminster Comments on Draft Project Description for review of Soil Action Levels

---

1.0 PROJECT DESCRIPTION AND PRODUCT

Important info. To be needs to in 1st P

.....The purposes of the project is to obtain an independent scientific determination of the appropriate model to be used to set a site specific soil action level for plutonium and americium at the Rocky Flats Environmental Technology Site. The panel will review the current model (RESRAD) as well as other available models and provide a determination of which model is most applicable to the Rocky Flats site. Specific attention will be given to the input parameters and the rationale of their use for setting a soil standard that is protective of future site users as well as the downwind communities and surface waters leaving the site. Actinide Migration Panel findings will be taken into consideration when determining input parameters. Additionally, a review of standards that have been set both locally and nationally will be undertaken to determine if they have an application for setting a Rocky Flats standard.

very heated issue leave it in or take it out

A thirteen member oversight panel consisting of six local government representatives, two each from the scientific community, environmental groups, local residents and one potential Citizens Advisory Board will be convened. Ex-officio members will consist of one representative each from the Colorado Department of Health and Environment, the Environmental Protection Agency, Department of Energy and Kaiser Hill, the Integrating Contractor.

The results and recommendations of the scientific review panel will be incorporated into the RFCA .

2.2 Establishment of the Oversight Panel.

The community based- oversight panel will serve as volunteers. The panel shall be called the .....

.....two members of the general public. Applicants who reside within the ten mile, downwind radius of the site will be given preference .

....An interim ad hoc group consisting of the following.....CAB Ken Korkia staff, Victor Holm interested citizen.

2.5....paragraph needs to be reworked it is narrative.

4.0 Special Issues

4.1 Establishment of the RSAL should be spelled office..add the scenarios ...future office worker industrial area, resident in the buffer zone should institutional controls fail. A determination as to whether the entire site should be cleaned up to a future resident scenario in order to protect the downwind communities should be made.

4.4 Input Parameters

Should read 651 pCi/gram instead of 561.

4.5 Unique Site Specific Conditions

This again is a narrative. We are looking for a scientific review not a sociological study. These issues should not come under the scope of this review. At this point Prebles mouse habitat questions, flow through of site surface water, groundwater remediation modeling for impacts on surface water, future site use reuse, building disposition, offsite waste disposal have not been resolved. I suggested we delete this section.

Cost should not exceed $800,000.

Timeline should not exceed one year.

SHEET NO. ..... OF .....

JOB NO. SAL Ad Hoc Group

BY RS

DATE ..... TIME .....

City of Broomfield

One DesCombes Drive • P.O. Box 1415 • Broomfield, Colorado 80020

Jacque Beradini:

- contracting process will take 2 months +
- short cut the process - use existing Radiological Assessment Corp contract w/a new task
  / subcontract w/a group that the group approve of

Joe Goldfield - not happy about using HP contractor potential conflict tied too closely w/ CDPHE

RAC - do they have experts already on board

Tom Marshal - 2 pieces review of the methodology - review of dose #'s

Jacque - NAS report out in Dec '97 either do another phase of study or not - likely will need further study (off the record)

NAS looking at risk per unit mrem

EPA will use that to set mrem/yr dose

SAL Mtg 11-19-97

Name	Org	Phone / Fax
KATHY SCHNOOR	CITY OF BROOMFIELD	438-6363 / 438-6234
SAM DIXION	" " West	email: dixisam@aol.c
Mary Hallow	" " "	426-1202 / 429-3713
BOB KANICK	CITIZEN re BOULDER, RFCAB	on file
Ken Korkia	RFCAB	444-0049 / 444-0072
VICTOR HOLM	RFCAB	420-7855 / 7579
Joe Goldfield	SWMCAB	989-9086
Carl Stoxell	Broomfield	321-7276
Jane Thompson	DOE-RFFO	466-5486
John Corsi	KH	966-2080 / 6633
Joe Legare	DOE-RFFO	~~966~~-6526
Steve Slaten	" "	966-5918
Gary Kleeman	EPA	966-4839
Carl Spreng	CDPHE	312-6246 / 6067
EDD KRAY	CDPHE	692-3358 / 759-5355
NORMIE MORIN	CDPHE	966-2115 / 544
LeRoy Moore	RMAJC	692-2645
David C. Shelton	K-H	444-6981 / 444-652
John Corsi	K-H	966-9877 / 966-5001
		966-6526 / 6153

SHEET NO. .... OF ....

JOB NO. ....

City of Broomfield
One DesCombes Drive • P.O. Box 1415 • Broomfield, Colorado 80020

BY ....

DATE .... TIME ....

TO DO:

✓ FAX revised program desc to CDPHE
✓ Arrange mtg rms for Subcommittee ✓ Dec 3
AdHoc Group ✓ Dec 12
Arrange for ads 3 papers — [illegible] (Chuck Hensel 466-6425
✓ Press Release
✓ Closure
✓ RFLII Impacts

FAX Mtg Announcement for mtgs — RF person
Weds Dec 3 — different short (9) — Victor, Bob, Hank, Micky, LeRoy, Joe Goldfield, Kathy, Ward Wicker(?)
9AM–Noon
Friday Dec 12 entire group
1–3PM

Agenda for Dec 12th Mtg
✓ Project Discrip. sent to CDPHE — response?
– Memo from Jackie Berardini – NRC public notic.
– Citizen Panel Membership selection process
apptmts to date
– (copies of newspaper ads)
& Press Release

City of Broomfield

One DesCombes Drive, Broomfield Colorado 80020

Fax Cover Sheet

DATE: November 11, 1997
FROM: Kathy Schnoor, Environmental Services Phone: 438-6363
TO: Distribution List
RE: Rocky Flats Soil Action Ad-Hoc Meeting - November 19, 1997

		PHONE	FAX
Jackie Berardini	CDPHE	692-3472	782-0095
Jeff Ciocco, Jim Fiore, Ray Greenberg	DOE HQ	(301) 903-7459	(301) 903-3877
John Corsi	Kaiser Hill	966-6526	966-6153
Sam Dixion	City of Westminster	426-1202	429-5113
Joe Goldfield	RFCAB-SNM	321-7276	
Mary Harlow	City of Westminster	430-2400 x 2174	650-1643
Tim Holeman	City of Broomfield	355-5492	355-5530
Victor Holm	RFCAB	989-9086	980-9076
Bob Kanick	RFCAB	444-0049	444-0072
Jeremy Karpatkin	DOE	966-2080	966-6633
Ken Korkia	RFCAB	420-7855	420-7579
Edd Kray	CDPHE	966-2115	966-5449
Tom Marshall	RFCAB	444-6981	444-6523
LeRoy Moore	RMPJC	444-6981	444-6523
Dr. Norma Morin	CDPHE	692-2645	782-0188
Tim Rehder	EPA	312-6293	312-6067
Jessie Roberson	DOE/RFFO	966-2025	966-6054
Kathy Schnoor	City of Broomfield	438-6363	438-6234
Dave Shelton	Kaiser Hill	966-9877	966-5001
Steve Slaten	DOE	966-4839	966-3710
Hank Stovall	City of Broomfield	466-5986	469-8554
Steve Tarlton	CDPHE	692-3423	782-4969

Number of pages including cover sheet: 8.

If all pages are not received or are not received clearly, please contact Diane Eismann at 438-6360.

Due to transmission error I am re-FAXing - Sorry for the inconvenience. KS

98

F-A-X M-E-M-O-R-A-N-D-U-M
November 11, 1997

TO: Soil Action Level Ad-Hoc Group

FROM: Hank Stovall, Broomfield Council Member (466-5986)
Kathy Schnoor, City of Broomfield (438-6363)

RE: Soil Action Level Ad-Hoc Meeting - November 19, 1997

Please find the attached RSAL independent study draft project description. This latest draft version includes the edits discussed at the November 4th meeting of the sub-committee. Bob Kanick submitted some additional comments for consideration. They are attached as well. The current draft will be discussed at a meeting scheduled for November 19, 1997 from 11:00 AM to 1:30 PM at Broomfield City Hall Zang's Spur Conference Room (in the basement). Please bring a brown bag lunch.

Proposed Agenda

Introductions

Topics to be Covered:

- Draft Project Description
- Project Timeline
- Options for Project Funding
- Oversite Panel Membership
    - appointments by local governments, public interest groups, etc.
    - selection process for technical/scientific members and general public members
- Peer Review Process
- Public Participation Process
- Role of CDPHE clarified
    - contracting
    - meeting facilitation

Other Issues

- Update on NAS review of 15/85 mrem dose levels

Next Meeting- date, time, location

Adjourn 1:30 PM

99

Review of Radionuclides in Soils CleanupAction Level Modeling
Draft Project Description
(Corrected Version II) November 11, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels. The purposes of the project are to obtain an independent scientific determination of the appropriate model to be used to set a site specific soil action level for radionuclides in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted and peer reviewed by acknowledged experts chosen by an independent oversight panel.

A thirteen member oversight panel will be formed and will consist of a combination of local government, federal and state regulators, environmental groups, technical experts and interested citizens. Over a twelve month period the group will, through CDPHE, contract with appropriate professional specialists to assess the appropriateness of the current RESRAD model and any alternative models. The panel will review the current model (RESRAD) as well as other available models and provide a determination of which model is most applicable to the Rocky Flats site. Specific attention will be given to the input parameters and the rationale of their use for setting a soil standard that is protective of future site users, including the potential impact to downwind communities and surface waters leaving the site.

Actinide Migration Panel findings will be taken into consideration when determining input parameters. Additionally, a review of standards that have been set both locally and nationally will be undertaken to determine if they have an application for setting a Rocky Flats Standard. The project will focus primarily on soil conditions on-site, but will attempt to integrate the Actinide Panel's analysis of the movement, mobility and fate of radionuclides from on-site soils.

The results of this investigation and evaluation will be shared with the RFCA principals to provide additional guidance in revisions to soil action levels. An RFP will be issued and the panel, with the logistical assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor.

2.0 Process and Administration

2.1 Project Administration

The interim group endorses the use of the Colorado Department of Public Health and Environment, through the office of the Rocky Flats Health Advisory Panel, to serve as the administrative conduit for allocation of the monies, administration of the contract and secretarial and organizational requirements of the oversight panel.

2.2 Establishment of the Oversight panel

The community-based oversight group shall be called the *Rocky Flats Radionuclide Soil Action Level Oversight Panel* and serve as volunteers. The Oversight Panel shall consist of the following members:

- Six members of local government. The members shall be self-selected by the consensus approval of interested local governments
- Two members of the public interest community.Members shall be self-selected by the consensus approval of interested public interest groups.
- Three representatives from the Technical community to include one representative from the HAP. Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.
- Two members of the general public most impacted by Rocky Flats . Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.
- One member of the RFCAB. Member shall be nominated by the CAB.

Ex-officio members: U.S. Department of Energy
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

An Interim adhoc group consisting of the following members will convene to guide creation of the full panel. The interim panel consists of the following representatives; City of Broomfield (Hank Stovall and Kathy Schnoor); City of Westminster(Sam Dixion and Mary Harlow); The Peace and Justice Center (LeRoy Moore); CAB; (Tom Marshall and Ken Korkia); Victor Holm and Robert Kanick); Ex-officio (DOE - Steve Slaten; Kaiser-Hill - Dave Shelton and John Corsi); CDPHE (Norma Morin and Ed Kray).

2.3 Selection of a Contractor(s)

The oversight panel shall oversee the refinement of the Principal Investigation and Evaluations Questions (described below - 3.0) to be addressed by outside contractors. The panel shall utilize the expertise of a contractor or contractors to conduct the research needed to address the Principal Investigation and Evaluation Questions and consideration special issues. An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor, including design of peer review processes.

2.4 Process Management

All meetings shall be advertised and open to the public. The general public shall be encouraged to provide input to the panel. The panel shall strive for consensus and define a process for when consensus is required and when a majority vote is required. The panel should design a public participation process, and a stakeholder participation process which ensures

early input from interested stakeholders. CDPHE will assist the panel in drafting the necessary documents and the RFP. In addition to administrative and coordinating services, CDPHE will serve as an administrative liaison between the panel and the contractor and help disseminate information and results. DOE and Kaiser will work to ensure full access to all available data and relevant documentation. The Oversight panel will not be paid.

3.0 Principal Investigation and Evaluation Questions

Described below are the specific research questions to be answered by the project These questions will provide guidance in the development of an RFP, and serve as the basis for negotiation of a final scope of work with the winning contractor(s).

a. What are the various models which can be applied to the study of the impacts of radionuclides in Rocky Flats soils, including the RESRAD model? Analyze these models to determine which ones are applicable and best suited for the site-specific conditions unique to Rocky Flats.

b. What are the model input parameters and assumptions being applied for the existing models in use at Rocky Flats? Are these input parameters accurate and credible in simulating soil conditions and converting dose to RSAL and converting to risk. Each of these parameters should be commented upon as to distribution of possible values, from most conservative to least conservative (including a "reasonable" or "best estimate" value), and the sensitivity of these parameters to the final result.

c. By applying the best available soils model and appropriate input parameters, as well as the methodology or methodologies as defined in the RFP, how will the model results impact the translation of dose to soil action levels and the translation to risk?

d. What cleanup levels exist at other radionuclide contaminated sites and do the processes/models to determine cleanup levels have application for use at Rocky Flats.

4.0 Special Issues

Below is a list of issues for the panel and the contractor to keep in mind as the final scope of work is negotiated. This list is a compilation of concerns and working assumptions expressed by stakeholders, DOE, Kaiser-Hill, CDPHE and EPA to provide a backdrop for the final design of the scope of work.

4.1 **Establishment of the RSAL**: Under the Rocky Flats Cleanup Agreement, the RFCA principals agreed upon the current RSAL to establish interim soil action levels for radionuclides (primary plutonium and americium) to be protective of people using Rocky Flats after site closure. The RSAL did not consider off-site

migration. These RSAL's are to undergo periodic review as new information is available.

4.2 **Water Quality Standards:** The 0.15 pCi/L surface water standard for plutonium and americium were adopted by the Water Quality Control Commission to protect all off-site use of water both during and after closure. The RFCA principals believe that the application of the RSALs to the site will result in actinides remaining in low concentrations in the soils. Stakeholders believe that the synergy of surface/groundwater to soils should be considered in the review of input parameters in the RESRAD or other models.

4.3 **Off-site Migration:** The RESRAD model limits its review to on-site impacts. The primary scope of the research will be the review of the RESRAD model, but many stakeholders believe that the impacts on off-site migration of radionuclides is of highest concern. Therefore, the ongoing research of the Actinide migration panel and site investigations into the short and long-term migration and fate of the actinides should be woven into the contractors activities as appropriate for addressing the Principal Questions. The Panel should coordinate and incorporate the Actinide panel results into the timing of the activities of the contractor. It is expected that the contractor will meet at least once with the actinide migration investigators to share information and coordinate efforts as appropriate and that the oversight panel will be kept fully appraised of the activities and results of the actinide migration investigators. The contractor will be encouraged to evaluate new or improved soils models which strive to integrate multi-media considerations. Some stakeholders believe that by applying ALARA principles, actinides can be minimized and immobilized in order to reduce off-site migration.

4.4 **Input Parameters:** To ensure that the contractor will quantitatively address the research questions and in order to minimize the subjective level of interpretation on how the input parameters should be applied, the scope of work and the contractor must strive to identify, at the onset, the method by which input parameters are applied or tested. Choices include: Best estimate method, conservative method, bounding method, and probabilistic risk assessment method. Specifically, stakeholders are concerned that the 651pCi/gram of plutonium in combination with 117 pCi/gram of Americium 241 is high. Likewise, DOE is concerned that maximizing the conservatism of all input parameters could result in a model that lacks "reasonableness".

4.5 **Unique Site Specific Conditions:** The RFCA operates under the assumption that cleanup activities and cleanup levels will be sufficient to allow for a pre-determined future land use. For comparative purposes, review of the models should also consider the impact of a range of reasonably foreseeable land uses.

This assumption, as well as off-site land use developments, provide an important backdrop for the application of a preferred model. In addition, other issues

impacting soils include: community acceptance of institutional controls; the prospect for deployment of innovative/cost effective soils remediation technologies; the opportunity for off-site disposal of soils and building rubble; and, the importance of buffer zone preservation and critical habitat. All these issues, many of which are in flux, should be recognized when judging the applicability of the RESRAD or other models at Rocky Flats and the adequacy or appropriateness of the model inputs.

4.6 **Quality Assurance:** Quality assurance is critical to ensure that the contractor results are credible, believable and consistent with established practices for analysis of radionuclides. The scope of work must ensure appropriate quality assurance and peer review protocols.

5.0 Timeline:

General Timeline:	- 12 to 15 months from date of contract.
October to December, 1997	- Convening of oversight committee; refinement of scope of work and development and issuance of RFQ.
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Jan to March, 1999	- Final report (Panel review and peer review)

6.0 Estimated Cost:

$800,000 to $1,500,000	* Preliminary estimates by CDPHE

TELEFAX

Date: 11/07/97

To: Tim Holeman
From: Bob Kanick

Fax: (303) 355-5530
Fax: (303) 444-0072

Reference ID: n/a
Subject: SALs independent review draft scope

Pages (incl.): 1

Dear Tim,

Here are my comments regarding the draft project description for the SAL review. In general I feel that, to avoid endless wordsmithing of this charter, less is more. So, if you were to ask me, I'd make things as minimally objectionable to everyone as possible (i.e., generic) and remove whatever seems to detailed for what should be a broad statement of our goals. Just a thought.

I do however have the following recommendations:

1. With respect to item (3.0.b), remove the mention of "and risk". Risk has to do with the setting of dose limits and is a completely different analysis (which the DOE has stated will not be re-reviewed - and I agree it has no place here).
2. Also with respect to item (3.0.b), since there was some confusion and disagreement regarding the phrase "(including a "reasonable" value)" I would suggest the phrase "(including what can be considered a "most probable" or "best estimate")" value, which, contrary to the disagreement at the last meeting, are basically the same thing.
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5. Finally, with respect to item (4.4), I appreciate your trying to encapsulate the thought in my letter and, in fact, I think you did so with the first sentence. Therefore, I would recommend deleting from "Among others,...." to the end of the paragraph. However, if you think it aids clarity, I would add the following sentence: "The method or methods to be used (e.g., best estimate, conservative, bounding, probabilistic risk assessment) are to be justified by the contractor and agreed upon in advance with the oversight panel".

I hope these are helpful. But again, in my opinion, I would simplify this document as much as possible so that we can proceed to the details of defining the independent review itself.

Sincerely,

Bob Kanick

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1st mtg

City of Broomfield

One DesCombes Drive, Broomfield Colorado 80020

Fax Cover Sheet

DATE: November 11, 1997
FROM: Kathy Schnoor, Environmental Services Phone: 438-6363
TO: Distribution List
RE: Rocky Flats Soil Action Ad-Hoc Meeting - November 19, 1997

		PHONE	FAX
Jackie Berardini	CDPHE	692-3472	782-0095
Jeff Ciocco, Jim Fiore, Ray Greenberg	DOE HQ	(301) 903-7459	(301) 903-3877
John Corsi	Kaiser Hill	966-6526	966-6153
Sam Dixion	City of Westminster	426-1202	429-5113
Joe Goldfield	RFCAB-SNM	321-7276	
Mary Harlow	City of Westminster	430-2400 x 2174	650-1643
Tim Holeman	City of Broomfield	355-5492	355-5530
Victor Holm	RFCAB	989-9086	980-9076
Bob Kanick	RFCAB	444-0049	444-0072
Jeremy Karpatkin	DOE	966-2080	966-6633
Ken Korkia	RFCAB	420-7855	420-7579
Edd Kray	CDPHE	966-2115	966-5449
Tom Marshall	RFCAB	444-6981	444-6523
LeRoy Moore	RMPJC	444-6981	444-6523
Dr. Norma Morin	CDPHE	692-2645	782-0188
Tim Rehder	EPA	312-6293	312-6067
Jessie Roberson	DOE/RFFO	966-2025	966-6054
Kathy Schnoor	City of Broomfield	438-6363	438-6234
Dave Shelton	Kaiser Hill	966-9877	966-5001
Steve Slaten	DOE	966-4839	966-3710
Hank Stovall	City of Broomfield	466-5986	469-8554
Steve Tarlton	CDPHE	692-3423	782-4969

Number of pages including cover sheet: 8.

If all pages are not received or are not received clearly, please contact Diane Eismann at 438-6360.

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F-A-X M-E-M-O-R-A-N-D-U-M
November 11, 1997

TO: Soil Action Level Ad-Hoc Group

FROM: Hank Stovall, Broomfield Council Member (466-5986)
Kathy Schnoor, City of Broomfield (438-6363)

RE: Soil Action Level Ad-Hoc Meeting - November 19, 1997

Please find the attached RSAI independent study draft project description. This latest draft version includes the edits discussed at the November 4th meeting of the sub-committee. Bob Kanick submitted some additional comments for consideration. They are attached as well. The current draft will be discussed at a meeting scheduled for November 19, 1997 from 11:00 AM to 1:30 PM at Broomfield City Hall Zang's Spur Conference Room (in the basement). Please bring a brown bag lunch.

Proposed Agenda

Introductions

Topics to be Covered:

- Draft Project Description
- Project Timeline
- Options for Project Funding
- Oversite Panel Membership
    - appointments by local governments, public interest groups, etc.
    - selection process for technical/scientific members and general public members
- Peer Review Process
- Public Participation Process
- Role of CDPHE clarified
    - contracting
    - meeting facilitation

Other Issues

- Update on NAS review of 15/85 mrem dose levels

Next Meeting- date, time, location

Adjourn 1:30 PM

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Review of Radionuclides in Soils CleanupAction Level Modeling
Draft Project Description
November 14, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels. The purposes of the project is to obtain an independent scientific determination of the appropriate model to be used to set a site specific soil action level for radionuclides in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted and peer reviewed by acknowledged experts chosen by an independent oversight panel.

A thirteen oversight panel will be formed and will consist of a combination of local government, federal and state regulators, environmental groups, technical experts and interested citizens. Over a twelve month period the group will, through CDPHE, contract with appropriate professional specialists to assess the appropriateness of the current RESRAD model and any alternative models. The panel will review the current model (RESRAD) as well as other available models and provide a determination of which model is most applicable to the Rocky Flats site. Specific attention will be given to the input parameters and the rationale of their use for setting a soil standard that is protective of future site users, including the potential impact to downwind communities and surface waters leaving the site.

Actinide Migration Panel findings will be taken into consideration when determining input parameters. Additionally, a review of standards that have been set both locally and nationally will be undertaken to determine if they have an application for setting a Rocky Flats Standard. The project will focus primarily on soil conditions on-site, but will attempt to integrate the Actinide Panel's analysis of the movement, mobility and fate of radionuclides from on-site soils.

The results of this investigation and evaluation will be shared with the RFCA principals to provide additional guidance in revisions to soil action levels. An RFP will be issued and the panel, with the logistical assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor.

2.0 Process and Administration

2.1 Project Administration

The interim group endorses the use of the Colorado Department of Public Health and Environment, through the office of the Rocky Flats Health Advisory Panel, to serve as the administrative conduit for allocation of the monies, administration of the contract and secretarial and organizational requirements of the oversight panel.

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2.2 Establishment of the Oversight panel

The community-based oversight group shall be called the *Rocky Flats Radionuclide Soil Action Level Oversight Panel* and serve as volunteers. The Oversight Panel shall consist of the following members:

- Six members of local government. The members shall be self-selected by the consensus approval of interested local governments
- Two members of the public interest community. Members shall be self-selected by the consensus approval of interested public interest groups.
- Three representatives from the Technical community to include one representative from the HAP. Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.
- Two members of the general public most impacted by Rocky Flats . Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.
- One member of the RFCAB. Member shall be nominated by the CAB.

Ex-officio members: U.S. Department of Energy
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

An Interim adhoc group consisting of the following members will convene to guide creation of the full panel. The interim panel consists of the following representatives: City of Broomfield (Hank Stovall and Kathy Schnoor); City of Westminster(Sam Dixion and Mary Harlow); The Peace and Justice Center (LeRoy Moore); CAB; (Tom Marshal and Ken Korkia); Victor Holm and Robert Kanick); Ex-officio (DOE - Steve Slaten; Kaiser-Hill - Dave Shelton and John Corsi); CDPHE (Norma Morin and Ed Kray).

2.3 Selection of a Contractor(s)

The oversight panel shall oversee the refinement of the Principal Investigation and Evaluations Questions (described below - 3.0) to be addressed by outside contractors. The panel shall utilize the expertise of a contractor or contractors to conduct the research needed to address the Principal Investigation and Evaluation Questions and consideration special issues. An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor, including design of peer review processes.

2.4 Process Management

All meetings shall be advertised and open to the public. The general public shall be encouraged to provide input to the panel. The panel shall strive for consensus and define a process for when consensus is required and when a majority vote is required. The panel should

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design a public participation process, and a stakeholder participation process when ensures early input from interested stakeholders. CDPHE will assist the panel in drafting the necessary documents and the RFP. In addition to administrative and coordinating services, CDPHE will serve as an administrative liaison between the panel and the contractor and help disseminate information and results. DOE and Kaiser will work to ensure full access to all available data and relevant documentation. The Oversight panel will not be paid.

3.0 Principal Investigation and Evaluation Questions

Described below are the specific research questions to be answered by the project. These questions will provide guidance in the development of an RFP, and serve as the basis for negotiation of a final scope of work with the winning contractor(s).

a. What are the various models which can be applied to the study of the impacts of radionuclides in Rocky Flats soils, including the RESRAD model? Analyze these models to determine which ones are applicable and best suited for the site-specific conditions unique to Rocky Flats.

b. What are the model input parameters and assumptions being applied for the existing models in use at Rocky Flats? Are these input parameters accurate and credible in simulating soil conditions and converting dose to RSAL and converting to risk. Each of these parameters should be commented upon as to distribution of possible values, from most conservative to least conservative (including a "reasonable" or "best estimate" value), and the sensitivity of these parameters to the final result.

c. By applying the best available soils model and appropriate input parameters, as well as the methodology or methodologies as defined in the RFP, how will the model results impact the translation of dose to soil action levels and the translation to risk?

d. What cleanup levels at other radionuclide contaminated sites and do these processes/models have application for use at Rocky Flats.

4.0 Special Issues

Below is a list of issues for the panel and the contractor to keep in mind as the final scope of work is negotiated. This list is a compilation of concerns and working assumptions expressed by stakeholders, DOE, Kaiser-Hill, CDPHE and EPA to provide a backdrop for the final design of the scope of work.

4.1 **Establishment of the RSAL**: Under the Rocky Flats Cleanup Agreement, the RFCA principals agreed upon the current RSAL to establish interim soil action levels for radionuclides (primary plutonium and americium) to be protective of people using Rocky Flats after site closure. The RSAL did not consider off-site

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a backdrop for the final design of the scope of work.

4.1 **Establishment of the RSAL**: Under the Rocky Flats Cleanup Agreement, the RFCA principals agreed upon the current RSAL to establish interim soil action levels for radionuclides (primary plutonium and americium) to be protective of people using Rocky Flats after site closure. The RSAL did not consider off-site migration. These RSAL's are to undergo periodic review as new information is available.

4.2 **Water Quality Standards:** The 0.15 pCi/L surface water standard for plutonium and americium were adopted by the Water Quality Control Commission to protect all off-site use of water both during and after closure. The RFCA principals believe that the application of the RSALs to the site will result in actinides remaining in low concentrations in the soils. Stakeholders believe that the synergy of surface/groundwater to soils should be considered in the review of input parameters in the RESRAD or other models.

4.3 **Off-site Migration:** Recognizing the lead role of the actinide panel, stakeholders appreciate the potential for long-term off-site migration either through air, water or soil, and believe that a new or improved soils model should strive to integrate multi-media considerations. Some stakeholders believe that by applying ALARA principles, actinides can be minimized and immobilized in order to reduce off-site migration.

4.4 **Input Parameters:** To ensure that the contractor will quantitatively address the research questions and in order to minimize the subjective level of interpretation on how the input parameters should be applied, the scope of work and the contractor must strive to identify, at the onset, the method by which input parameters are applied or tested. Among others, choices include: Best estimate method, conservative method, bounding method, and probabilistic risk assessment method. Specifically, stakeholders are concerned that the 561pCi/gram action levels is high. Likewise, DOE is concerned that maximizing the conservatism of all input parameters could result in a model that lacks "reasonableness".

4.5 **Uniquie Site Specific Conditions:** The RFCA operates under the assumption that cleanup activities and cleanup levels will allow for a future land use scenario of ???? This assumption, as well as off-site land use developments, provide an important backdrop for the application of a preferred model. In addition, other issues impacting soils include: community acceptance of institutional controls; the prospect for deployment of innovative/cost effective soils remediation technologies; the opportunity for off-site disposal of soils and building rubble; and, the importance of buffer zone preservation and critical habitat. All these issues, many of which are in flux, should be recognized when judging the applicability of the RESRAD or other models at Rocky Flats and the adequacy or

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appropriateness of the model inputs.

4.6 **Quality Assurance:** Quality assurance is critical to ensure that the contractor results are credible, believable and consistent with established practices for analysis of radionuclides. The scope of work must ensure appropriate quality assurance and peer review protocals.

5.0 Timeline:

General Timeline:	- 12 to 15 months from date of contract.
October to December, 1997	- Convening of oversight committee; refinement of scope of work and development and issuance of RFQ.
January, 1998	- Award of contract.
March to Dec, 1998	- Contractor performs scope of work with quarterly technical review meeting with the panel and the public.
Jan to March, 1999	- Final report (Panel review and peer review)

6.0 Estimated Cost:

$800,000 to $1,500,000	* Preliminary estimates by CDPHE

1/2

TELEFAX

Date: 11/07/97

To: Tim Holeman **Fax:** (303) 355-5530
From: Bob Kanick **Fax:** (303) 444-0072

Reference ID: n/a **Pages (incl.):** 1
Subject: SALs independent review draft scope

Dear Tim,

Here are my comments regarding the draft project description for the SAL review. In general I feel that, to avoid endless wordsmithing of this charter, less is more. So, if you were to ask me, I'd make things as minimally objectionable to everyone as possible (i.e., generic) and remove whatever seems to detailed for what should be a broad statement of our goals. Just a thought.

I do however have the following recommendations:

1. With respect to item (3.0.b), remove the mention of "and risk". Risk has to do with the setting of dose limits and is a completely different analysis (which the DOE has stated will not be re-reviewed - and I agree it has no place here).
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I hope these are helpful. But again, in my opinion, I would simplify this document as much as possible so that we can proceed to the details of defining the independent review itself.

Sincerely,

Bob Kanick

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11/19/97
Kathy's edits

F-A-X M-E-M-O-R-A-N-D-U-M
November 11, 1997

TO: Soil Action Level Ad-Hoc Group

FROM: Hank Stovall, Broomfield Council Member (466-5986)
Kathy Schnoor, City of Broomfield (438-6363)

RE: Soil Action Level Ad-Hoc Meeting - November 19, 1997

Please find the attached RSAL independent study draft project description. This latest draft version includes the edits discussed at the November 4th meeting of the sub-committee. Bob Kanick submitted some additional comments for consideration. They are attached as well. The current draft will be discussed at a meeting scheduled for November 19, 1997 from 11:00 AM to 1:30 PM at Broomfield City Hall Zang's Spur Conference Room (in the basement). Please bring a brown bag lunch.

<u>Proposed Agenda</u>

Introductions

Topics to be Covered: — use this as a Charter
- Draft Project Description
- Project Timeline 12 month.
- Options for Project Funding — identify funding, cost estimate from DOE
- Oversite Panel Membership
  - appointments by local governments, public interest groups, etc.
  - selection process for technical/scientific members and general public members (adding publicity)
- Peer Review Process
- Public Participation Process
- Role of CDPHE clarified
  - contracting
  - meeting facilitation

Neils Schonbeck
Jim [illegible]
Jack [illegible]
Jim [illegible] (Norma)

Other Issues

- Update on NAS review of 15/85 mrem dose levels — should get something from [illegible] today or tomorrow

Next Meeting- date, time, location

Adjourn 1:30 PM

Mtg Bldg 060, Actinide Mtg
Rm 119

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Review of Radionuclides in Soils CleanupAction Level Modeling
Draft Project Description
(Corrected Version II) November 11, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels. The purposes of the project are to obtain an independent scientific determination of the appropriate model to be used to set a site specific soil action level for radionuclides in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted and peer reviewed by acknowledged experts chosen by an independent oversight panel. (for protection onsite & off site

A thirteen member oversight panel will be formed and will consist of a combination of local government, federal and state regulators, environmental groups, technical experts and interested citizens. Over a twelve month period the group will, through CDPHE, contract with appropriate professional specialists to assess the appropriateness of the current RESRAD model and any alternative models. The panel will review the current model (RESRAD) as well as other available models and provide a determination of which model is most applicable to the Rocky Flats site. Specific attention will be given to the input parameters and the rationale of their use for setting a soil standard that is protective of future site users, including the potential impact to downwind communities and surface waters leaving the site.

Actinide Migration Panel findings will be taken into consideration when determining input parameters. Additionally, a review of standards that have been set both locally and nationally will be undertaken to determine if they have an application for setting a Rocky Flats Standard. The project will focus primarily on soil conditions on-site, but will attempt to integrate the Actinide Panel's analysis of the movement, mobility and fate of radionuclides from on-site soils. & where appropriate,

The results of this investigation and evaluation will be shared with the RFCA principals to provide additional guidance in revisions to soil action levels. An RFP will be issued and the panel, with the logistical assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning ~~the~~ contractor.

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115

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Ex-officio members: U.S. Department of Energy
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

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impacting soils include: community acceptance of institutional controls; the prospect for deployment of innovative/cost effective soils remediation technologies; the opportunity for off-site disposal of soils and building rubble; and, the importance of buffer zone preservation and critical habitat. All these issues, many of which are in flux, should be recognized when judging the applicability of the RESRAD or other models at Rocky Flats and the adequacy or appropriateness of the model inputs.

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This assumption, as well as off-site land use developments, provide an important backdrop for the application of a preferred model. In addition, other issues

11/10/97 MON

TELEFAX

Date: 11/07/97

To: Tim Holeman
From: Bob Kanick

Fax: (303) 355-5530
Fax: (303) 444-0072

Reference ID: n/a
Subject: SALs independent review draft scope

Pages (incl.): 1

Dear Tim,

Here are my comments regarding the draft project description for the SAL review. In general I feel that, to avoid endless wordsmithing of this charter, less is more. So, if you were to ask me, I'd make things as minimally objectionable to everyone as possible (i.e., generic) and remove whatever seems to detailed for what should be a broad statement of our goals. Just a thought.

I do however have the following recommendations:

1. With respect to item (3.0.b), remove the mention of "and risk". Risk has to do with the setting of dose limits and is a completely different analysis (which the DOE has stated will not be re-reviewed - and I agree it has no place here).
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I hope these are helpful. But again, in my opinion, I would simplify this document as much as possible so that we can proceed to the details of defining the independent review itself.

Sincerely,

Bob Kanick

decided to
after these comments & a
later discussion of the
oversight board

120

Review of Radionuclides in Soils Cleanup Action Level Modelling
Draft Project Description
November 11, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy (DOE) has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels. The purpose of the project is to obtain an independent scientific determination of the appropriate model to be used to set a site specific soil action level for radionuclides in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted and peer reviewed by acknowledged experts chosen by an independent oversight panel.

A thirteen member oversight panel will be formed and will consist of a combination of local government, federal and state regulators, environmental groups, technical experts and interested citizens. Over a twelve month period the group will, through CDPHE, contract with appropriate professional specialists to assess the appropriateness of the current RESRAD model and any alternative models. The panel will review the current model (RESRAD) as well as other available models and provide a determination of which model is most applicable to the Rocky Flats site. Specific attention will be given to the input parameters and the rationale of their use for setting a soil standard that is protective of future site users, including the potential impact to downwind communities and surface waters leaving the site.

Actinide Migration Panel findings will be taken into consideration when determining input parameters. Additionally, a review of standards that have been set both locally and nationally will be undertaken to determine if they have an application for setting a Rocky Flats Standard. The project will focus primarily on soil conditions on-site, but will attempt to integrate the Actinide Panel's analysis of the movement, mobility and fate of radionuclides from on-site soils.

The results of this investigation and evaluation will be shared with the RFCA principals to provide additional guidance in revisions to soil action levels. An RFP will be issued and the panel, with the logistical assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning contractor.

2.0 Process and Administration

2.1 Project Administration

The interim group endorses the use of the Colorado Department of Public Health and Environment, through the office of the Rocky Flats Health Advisory Panel, to serve

as the administrative conduit for allocation of the monies, administration of the contract and secretarial and organizational requirements of the oversight panel.

2.2 Establishment of the Oversight Panel

The community-based oversight group shall be called the *Rocky Flats Radionuclide Soil Action Level Oversight Panel* and serve as volunteers. The Oversight Panel shall consist of the following members:

- Six members of local government. The members shall be self-selected by the consensus approval of interested local governments.
- Two members of the public interest community. Members shall be self-selected by the consensus approval of interested public interest groups.
- Three representatives from the Technical community to include one representative from the HAP. Representatives shall be selected by the interim Ad Hoc group after a public notice and review of candidates.
- Two members of the general public most impacted by Rocky Flats. Representatives shall be selected by the interim ad hoc group after a public notice and review of the candidates.
- One member of the RFCAB. Member shall be nominated by the CAB.

- Ex-officio members:

  U.S. Department of Energy
  U.S. Environmental Protection Agency
  Colorado Department of Public Health and Environment

An interim ad hoc group consisting of the following members will convene to guide creation of the full panel. The interim panel consists of the following representatives; City of Broomfield (Hank Stovall and Kathy Schnoor); City of Westminster (Sam Dixion and Mary Harlow); The Rocky Mountain Peace and Justice Center (LeRoy Moore); Rocky Flats Citizen's Advisory Board (Tom Marshall, Ken Korkia, Victor Holm and Robert Kanick); Ex-officio (DOE-Steve Slaten, Kaiser-Hill-Dave Shelton and John Corsi, CDPHE-Norma Morin and Edd Kray).

interested citizens

2.3 Selection of a Contractor(s)

The oversight panel shall oversee the refinement of the Principal Investigation and Evaluations Questions (described below in section 3.0) to be addressed by the outside contractor. The panel shall utilize the expertise of a contractor or contractors to conduct the research needed to address the Principal Investigation and Evaluation Questions and consideration of special issues (described below in section 4.0). An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning contractor, including provisions for a peer review process.

2.4 Process Management

All meetings shall be advertised and open to the public. The general public shall be encouraged to provide input to the panel. The panel shall strive for consensus and define a process for when consensus is required and when a majority vote is required. The panel will design a public participation process and a stakeholder participation process which ensures early input from interested individuals and stakeholders. CDPHE will assist the panel in drafting the necessary documents and the RFP. In addition to administrative and co-ordinating services, CDPHE will serve as an administrative liaison between the panel and the contractor and help disseminate information and results. DOE and Kaiser will work to ensure full access to all available data and relevant documentation. The oversight panel will not be paid.

3.0 Principal Investigation and Evaluation Questions

Described below are the specific research questions to be answered by the project. These questions will provide guidance in the development of an RFP, and serve as the basis for negotiation of a final scope of work with the winning contractor(s).

a. What are the various models which can be applied to the study of the impacts of radionuclides in Rocky Flats soils, including the RESRAD model? Analyze these models to determine which ones are applicable and best suited for the site-specific conditions unique to Rocky Flats.

b. What are the model input parameters and assumptions being applied for the existing models in use at Rocky Flats? Are these input parameters accurate and credible in simulating soil conditions and converting dose to RSAL and converting to risk? Each of these parameters should be commented upon as to distribution of possible values, from most conservative to least conservative (including a "reasonable" or "best estimate" value), and the sensitivity of these parameters to the final result.

c. By applying the best available soils model and appropriate input parameters, as well as the methodology or methodologies as defined in the RFP, how will the model results impact the translation of dose to soil action levels and the translation to risk?

d. What cleanup levels exist at other radionuclide contaminated sites and do the processes/models to determine cleanup levels have application for use at Rocky Flats.

4.0 Special Issues

Below is a list of issues for the panel and the contractor to keep in mind as the final scope of work is negotiated. This list is a compilation of concerns and working assumptions

expressed by stakeholders, DOE, Kaiser-Hill, CDPHE and EPA to provide a backdrop for the final design of the scope of work.

4.1 **Establishment of the RSAL**: Under the Rocky Flats Clean up Agreement, the RFCA principals agreed upon the current interim RSAL to establish interim soil action levels for radionuclides (primarily plutonium and americium) to be protective of people using Rocky Flats after site closure. The RSAL did not consider off-site migration. These RSAL's are to undergo periodic review as new information is available.

4.2 **Water Quality Standards**: The 0.15 pCi/L surface water standards for plutonium and americium were adopted by the Water Quality Control Commission to protect all off-site use of water both during and after closure. The RFCA principals believe that the application of the RSALs to the site will result in actinides remaining in low concentrations in the soils. Stakeholders believe that the synergy of surface/groundwater to soils should be considered in the review of input parameters in the RESRAD or other models.

4.3 **Off-site Migration**: The RESRAD model limits its review to on-site impacts. the primary scope of the research will be the review of the RESRAD model, but many stakeholders believe that the impacts of off-site migration of radionuclides is of highest concern. Therefore, the ongoing research of the Actinide Migration Panel and site investigations into the short and long-term migration and fate of the actinides should be woven into the contractors activities as appropriate for addressing the Principal Questions. The Panel should co-ordinate and incorporate the Actinide Migration Panel results into the timing of the activities of the contractor. It is expected that the contractor will meet at least once with the actinide migration investigators to share information and co-ordinate efforts as appropriate and that the oversight panel will be kept fully appraised of the activities and results of the actinide migration investigators. The contractor will be encouraged to evaluate new or improved soils models which strive to integrate multi-media considerations. some stakeholders believe that by applying ALARA principles, actinides can be minimized and immobilized in order to reduce off-site migration.

4.4 **Input Parameters**: To ensure that the contractor will quantitatively address the research questions and in order to minimize the subjective level of interpretation on how the input parameters should be applied, the scope of work and the contractor must strive to identify, at the onset, the method by which input parameters are applied or tested. Choices include: Best estimate method, conservative method, bounding method, and probabilistic risk assessment method. Specifically, stakeholders are concerned that the 651 pCi/g of Plutonium-239,240 in combination with 117 pCi/g of Americium-421 is high. Likewise, DOE is concerned that maximizing the conservatism of all input parameters could result in a model that lacks "reasonableness."

4.5 **Unique Site Specific Conditions**: The RFCA operates under the assumption that cleanup[p activities and cleanup levels will be sufficient to allow for a

predetermined future land use. For comparative purposes, review of the models should also consider the impact of a range of reasonably foreseeable land uses from industrial to residential. This assumption, as well as off-site land use developments, provide an important backdrop for the application of a preferred mode. In addition, other issue impacting soils include: community acceptance of institutional controls; the prospect for deployment of innovative/cost effective soils remediation technologies; the opportunity for off-site disposal of soils and building rubble; and, the importance of buffer zone preservation and critical habitat. All these issues, many of which are in flux, should be recognized when judging the applicability of the RESRAD or other models at Rocky Flats and the adequacy or appropriateness of the model inputs.

4.6 **Quality Assurance**: Quality assurance is critical to ensure that the contractors results are credible, believable and consistent with established practices for analysis of radionuclides. the scope of work must ensure appropriate quality assurance and peer review protocols.

5.0 Timeline:

General Timeline:	12 to 15 months from the date of contract
October to December '97	Convening of the oversight panel; refinement of scope of work and development and issuance of RFP.
January 1998	Award of Contract
March to December 1998	Contractor performs scope of work with quarterly technical review meetings with the panel and the public.
January to March 1999	Final Report (Panel review and peer review)

6.0 Estimated Cost:

$800,000 to $1,500,000 Preliminary estimates by CDPHE

→ wide of a range

4.6 language

Specify a scientifically credible method for guaranteeing that the soil action level and associated clean up process will achieve the specified SAL and who should provide oversight.

Specify the sampling method, process protocol, chain of custody and Quality Control for collecting samples. What are the qualification criteria for the testing lab?

add under Quality assurance 4.6

Jas

466-5486

Hank,
- Soil sampling
- guarantee of understanding
- all
- higher lower cases

[illegible]

[illegible] the Qualification [illegible] for [illegible]

[illegible] under Quality assurance #6

[illegible]

City of Broomfield

One DesCombes Drive, Broomfield Colorado 80020

Fax Cover Sheet

DATE: November 11, 1997
FROM: Kathy Schnoor, Environmental Services Phone: 438-6363
TO: Distribution List
RE: Rocky Flats Soil Action Ad-Hoc Meeting - November 19, 1997

		PHONE	FAX
David Allen Skaggs Office			
Jackie Berardini	CDPHE	692-3472	782-0095
Jeff Ciocco, Jim Fiore, Ray Greenberg	DOE HQ	(301) 903-7459	(301) 903-3877
Deanne Gotlufield John Corsi	Kaiser Hill	966-6526	966-6153
Sam Dixion	City of Westminster	426-1202	429-5113
Joe Goldfield	RFCAB-SNM	321-7276	
Mary Harlow	City of Westminster	430-2400 x 2174	650-1643
Tim Holeman	City of Broomfield	355-5492	355-5530
Victor Holm	RFCAB	989-9086	980-9076
Bob Kanick	RFCAB	444-0049	444-0072
Jeremy Karpatkin	DOE	966-2080	966-6633
Ken Korkia	RFCAB	420-7855	420-7579
Edd Kray	CDPHE	966-2115	966-5449
Tom Marshall	RFCAB	444-6981	444-6523
LeRoy Moore	RMPJC	444-6981	444-6523
Dr. Norma Morin	CDPHE	692-2645	782-0188
Tim Rehder	EPA	312-6293	312-6067
Jessie Roberson	DOE/RFFO	966-2025	966-6054
Kathy Schnoor	City of Broomfield	438-6363	438-6234
Dave Shelton	Kaiser Hill	966-9877	966-5001
Steve Slaten	DOE	966-4839	966-3710
Hank Stovall	City of Broomfield	466-5986	469-8554
Steve Tarlton	CDPHE	692-3423	782-4969

Number of pages including cover sheet: 8.

If all pages are not received or are not received clearly, please contact Diane Eismann at 438-6360.

Due to transmission error I am re-FAXing - Sorry for the inconvenience. KS

127

F-A-X M-E-M-O-R-A-N-D-U-M
November 11, 1997

TO: Soil Action Level Ad-Hoc Group

FROM: Hank Stovall, Broomfield Council Member (466-5986)
Kathy Schnoor, City of Broomfield (438-6363)

RE: Soil Action Level Ad-Hoc Meeting - November 19, 1997

Please find the attached RSAL independent study draft project description. This latest draft version includes the edits discussed at the November 4th meeting of the sub-committee. Bob Kanick submitted some additional comments for consideration. They are attached as well. The current draft will be discussed at a meeting scheduled for November 19, 1997 from 11:00 AM to 1:30 PM at Broomfield City Hall Zang's Spur Conference Room (in the basement). Please bring a brown bag lunch.

Proposed Agenda

Introductions

Topics to be Covered:

- Draft Project Description
- Project Timeline
- Options for Project Funding
- Oversite Panel Membership
    - appointments by local governments, public interest groups, etc.
    - selection process for technical/scientific members and general public members
- Peer Review Process
- Public Participation Process
- Role of CDPHE clarified
    - contracting
    - meeting facilitation

Other Issues

- Update on NAS review of 15/85 mrem dose levels

Next Meeting- date, time, location

Adjourn 1:30 PM

Review of Radionuclides in Soils CleanupAction Level Modeling
Draft Project Description
(Corrected Version II) November 11, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels. The purposes of the project are to obtain an independent scientific determination of the appropriate model to be used to set a site specific soil action level for radionuclides in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted and peer reviewed by acknowledged experts chosen by an independent oversight panel.

A thirteen member oversight panel will be formed and will consist of a combination of local government, federal and state regulators, environmental groups, technical experts and interested citizens. Over a twelve month period the group will, through CDPHE, contract with appropriate professional specialists to assess the appropriateness of the current RESRAD model and any alternative models. The panel will review the current model (RESRAD) as well as other available models and provide a determination of which model is most applicable to the Rocky Flats site. Specific attention will be given to the input parameters and the rationale of their use for setting a soil standard that is protective of future site users, including the potential impact to downwind communities and surface waters leaving the site.

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The results of this investigation and evaluation will be shared with the RFCA principals to provide additional guidance in revisions to soil action levels. An RFP will be issued and the panel, with the logistical assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor.

2.0 Process and Administration

2.1 Project Administration

The interim group endorses the use of the Colorado Department of Public Health and Environment, through the office of the Rocky Flats Health Advisory Panel, to serve as the administrative conduit for allocation of the monies, administration of the contract and secretarial and organizational requirements of the oversight panel.

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Ex-officio members: U.S. Department of Energy
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

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The oversight panel shall oversee the refinement of the Principal Investigation and Evaluations Questions (described below - 3.0) to be addressed by outside contractors. The panel shall utilize the expertise of a contractor or contractors to conduct the research needed to address the Principal Investigation and Evaluation Questions and consideration special issues. An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor, including design of peer review processes.

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All meetings shall be advertised and open to the public. The general public shall be encouraged to provide input to the panel. The panel shall strive for consensus and define a process for when consensus is required and when a majority vote is required. The panel should design a public participation process, and a stakeholder participation process which ensures

early input from interested stakeholders. CDPHE will assist the panel in drafting the necessary documents and the RFP. In addition to administrative and coordinating services, CDPHE will serve as an administrative liaison between the panel and the contractor and help disseminate information and results. DOE and Kaiser will work to ensure full access to all available data and relevant documentation. The Oversight panel will not be paid.

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Described below are the specific research questions to be answered by the project These questions will provide guidance in the development of an RFP, and serve as the basis for negotiation of a final scope of work with the winning contractor(s).

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This assumption, as well as off-site land use developments, provide an important backdrop for the application of a preferred model. In addition, other issues

impacting soils include: community acceptance of institutional controls; the prospect for deployment of innovative/cost effective soils remediation technologies; the opportunity for off-site disposal of soils and building rubble; and, the importance of buffer zone preservation and critical habitat. All these issues, many of which are in flux, should be recognized when judging the applicability of the RESRAD or other models at Rocky Flats and the adequacy or appropriateness of the model inputs.

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General Timeline:	- 12 to 15 months from date of contract.
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6.0 Estimated Cost:

$800,000 to $1,500,000	* Preliminary estimates by CDPHE

TELEFAX

Date: 11/07/97

To: Tim Holeman **Fax:** (303) 355-5530
From: Bob Kanick **Fax:** (303) 444-0072

Reference ID: n/a **Pages (incl.):** 1
Subject: SALs independent review draft scope

Dear Tim,

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Sincerely,

Bob Kanick

134

Chuck Hensel - Neighborhood Services
466-6425

SHEET NO. ..... OF .....
JOB NO. SAC Ad-Hoc
BY KS
DATE 11/19/97 TIME 11:00AM

City of Broomfield
One DesCombes Drive • P.O. Box 1415 • Broomfield, Colorado 80020

FAX : Kathy Deckler Deckler 782.0188
Proj. Descrip w/revisions to CDPHE for their
to ck w/legal - does it fit in
the RAC scope of work

Hank -
1) Conversation w/ Jacque Berardini this AM
CDPHE - role of CDPHE
(Admin. Support mtgs.
pay bills, contracting
copying, Faxing etc)

2) Facilitator - to keep notes on task & schedule
3) Submit our proj. description to CDPHE legal for review - can it be incorporated into RAC contract
4) Chg timeline to 12 Months.

Joe - what is the urgency
Diane - 903 planning

Project Description discussion
- risk & dose discussion
- we don't want to translate

But we have agreed we will not evaluate 15/85 increm
Hank - we agree that we are evaluating 15/85 incre
but we want to have risk left in - it is more
- as part of the scope
Joe - exercise last sentence 3.0 1 - it is basically done

Further discussion of Scope of the Study
onsite vs. offsite - group still deeply divided over off-site issue

SHEET NO. ..... OF .....

JOB NO. .....

BY .....

DATE ..... TIME .....

City of Broomfield

One DesCombes Drive • P.O. Box 1415 • Broomfield, Colorado 80020

Additional Publicity for Panel

~~1 paper~~ Volunteers Needed for

Ads 3 papers Dec 11th deadline

+

Closure
RFLII Impacts

work with
Kodie & Rosann do a press release

430-2400 x308
x2005

Group to Develop Scope of Work for RFP
- volunteers - Victor
Bob
Hank
Mickey
LeRoy
RF person
Ward Wicker?
Joe
Kathy

Mtg Weds Dec 3rd
9:00

Oversite Panel Selection Committee?
- selection process
- Sam will help with this process

Rocky Mountain Peace and Justice Center

P.O. Box 1156, Boulder, CO 80306 U.S.A. (303)444-6981 FAX(303)444-6523

November 8, 1997

Ms. Jackie Berardini
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80222-1530

Dear Jackie:

At the November 4 meeting on review of the Rocky Flats Soil Action Levels you disputed my remark that DOE and its regulators had ignored the recommendations of the Rocky Flats Future Site Use Working Group. You said that the agencies didn't ignore us, they simply disagreed with us. As a member of the FSUWG I'd like to explain how it looks to me and to others in that group. I do this not for the sake of argument but for improved public participation in the future.

The FSUWG consisted of a carefully chosen, broadly representative group of stakeholders plus ex officio members from the government agencies. We worked hard for a full year to come up with consensus recommendations regarding future use of the Rocky Flats site. Some of our recommendations were non-controversial, like the delineation of phases of cleanup. Others were problematic, such as our call for DOE to gain control of on-site mining rights so mining could be halted. Most controversial was our appeal for cleanup to average background level when it became technologically and economically possible to accomplish this in an environmentally sensitive manner. We said we didn't expect this right away, were willing to wait for as long as necessary, but expected ongoing pertinent research.

When we issued the report in June 1995 we may as well have thrown it down a well. The response from all the agencies was nil, nothing, void. Weeks, months passed. The agencies, meanwhile, issued the initial draft Vision for the Cleanup Agreement, flying in the face of much of what we had recommended, In response I eventually wrote the enclosed op-ed, which appeared in the Boulder Camera, Rocky Mountain News and Golden Transcript. After publication of this article, DOE manager Mark Silverman invited members of the FSUWG to a meeting, not to discuss the merits of our proposals but to tell the few who showed up what the agencies had decided and to try to convince us that the FSUWG was being taken seriously. It was a little late for this.

To this day, no one -- not DOE, not EPA, not CDPHE -- has called the FSUWG together to discuss with this group why its recommendations have or have not been accepted. And now it appears that future site use is going to be discussed anew without re-convening or consulting this group. Surely it's possible to do better.

Yours sincerely,

LeRoy Moore

cc: Jessie Roberson
Steve Tarlton
Tim Rehder
Deanne Butterfield
FSUWG members

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Sunday Camera
January 7, 1996

Rocky Flats 'Vision' ignores citizens' group

By LEROY MOORE

The Department of Energy, the Colorado Department of Public Health and Environment and the Environmental Protection Agency recently released a "Vision" proposing a dirty closure of Rocky Flats — things like creating a nuclear waste dump on the site eight miles south of Boulder, burying contaminated buildings and inadequate cleanup. This Vision disregards recommendations offered last June by the Rocky Flats Future Site Use Working Group, a citizen body created by DOE to tell it what the public wants at Rocky Flats now that DOE no longer makes nuclear bombs there.

Inclusive of a broad cross-section of public interests, the Working Group's mission was to make recommendations for the future use of the Rocky Flats site. Representatives of DOE, EPA and CDPHE participated throughout. In June, after a year of strenuous work, the group conveyed its hard-won consensus recommendations in the form of a final report.

Its task done, the group disbanded, expecting soon to receive a formal response to its recommendations from DOE. Now, six months later, Working Group members have just been told they will not receive the expected response. Instead, they have been given the Vision statement.

Group members are now wondering whether the time, money and energy put into their effort may have been for naught. For, while the Vision acknowledges the existence of the Working Group's report and refers to "community preferences for land use," the Vision document itself flies in the face of the group's recommendations. Consider:

1) Contrary to anything in the Future Site Use Working Group's report, the Vision proposes that the current high-security plutonium processing area at Rocky Flats become a landfill containing low-level nuclear waste covered with a 130-acre cap. Implicit in the Working Group report is the principle that no radioactive waste be buried on site. From this it follows that any such waste remaining on site should be stored above ground in monitored, retrievable form — that is, not buried.

Against the grain of everything contained in the Working Group report, the Vision proposes burying contaminated buildings on site.

2) The Working Group report presents a long-term vision of the site being returned to average background radiation levels when the technology to accomplish this in a cost-effective, environmentally sensitive manner is developed. The Vision, by contrast, dismisses this in favor of cleanup only to levels required for industrial use and open space. The Vision also, as noted, proposed further contamination of the site by turning parts of it into a landfill containing radioactive waste.

In recommending eventual cleanup to average background levels, the Working Group was mindful that the technology to move toward this pristine condition on site is not now available at any cost. The group nevertheless wanted to ensure that nothing is done on site to preclude the possibility of cleanup to this level at some future time. This rules out further contamination of the site, while it also requires developing relevant cleanup technology. It implies as well that the party responsible for the initial contamination — DOE — should not shirk its long-term responsibility to the people of the Denver area by abandoning the site prematurely.

3) Against the grain of everything contained in the Working Group report, the Vision proposes burying contaminated buildings on site.

4) The Working Group recommended that DOE purchase or protect all mineral rights to the whole Rocky Flats buffer zone to prevent future mining on the site. The Vision statement says nothing on this subject.

5) The Working Group recommended that industrial activity in the core area be restricted to cleanup and environmental technology. The Vision would permit other activities.

6) The Working Group recommended that most of the buffer zone be preserved as managed open space for environmental research and natural and cultural resource management. The Vision document may permit some of this land to be sold for industrial development.

7) The Working Group recommended that to guarantee cleanup of the site the federal government establish "a reliable funding mechanism, such as an earmarked, secure trust fund." The Vision says nothing on this topic, and instead seems to assume that current budget constraints should guide cleanup.

Differences of this magnitude lead readily to the conclusion that those who produced the Vision document respected neither the letter nor the spirit of the Future Site Use Working Group's report. Of course they worked behind closed doors without public participation — a pattern all too familiar at Rocky Flats.

The Vision has come in for a barrage of criticism since its release. Perhaps soon we will see a revised document presenting several alternatives for the future of Rocky Flats. But this isn't good enough. Any Vision meant to guide decisions about the Rocky Flats site should honor the following principles, all of which are either explicit or implicit in the recommendations of the Future Site Use Working Group:

- Everything done at Rocky Flats should leave open the possibility that some day the site can be cleaned to average background radiation levels.
- A concerted effort should be made to develop technology for cleanup of Rocky Flats.
- Any nuclear waste remaining on site must be stored above ground in monitored, retrievable form.
- Cleanup decisions must be driven by concern for the public health and long-term environmental integrity, not by current budgetary constraints.

These four principles should be honored in any Vision intended to guide decisions about the future of the Rocky Flats site. To express your views on the Vision, attend a public meeting with DOE officials at 7 p.m. Thursday at the Rocky Mountain Peace Center, 1520 Euclid in Boulder.

(LeRoy Moore, Ph.D., author of the Citizen's Guide to Rocky Flats and a consultant with the Rocky Mountain Peace Center in Boulder, was a member of the Rocky Flats Future Site Use Working Group.)

HEALTH EFFECTS OF PLUTONIUM CONTAMINATED SOIL

DISCUSSION OF SOIL CLEANUP STANDARDS

AND ERRORS IN CALCULATIONS OF
CONTAMINATED SOIL HEALTH EFFECTS

November 17, 1997

Prepared by
J. Goldfield

HEALTH EFFECTS OF PLUTONIUM CONTAMINATED SOIL

J. Goldfield 3rd Revision, November 1997

Summary

The health effects of radioactive materials are evaluated by exposure levels given in mrem/yr (millirem per year). Acceptable levels range from 2 mrem/yr recommended by the English as an ALARA (as low as reasonably attainable) guideline to 100 mrem/yr posed as acceptable for residential use at the Nevada Test site. This fifty-fold difference suggests a lack of consensus and/or of certainty of the "correct" value. Nevertheless, the level to which soil contaminated with plutonium must be cleaned given in pCi/g (picocuries per gram of soil) is based on the mrem/yr of exposure.

The following Table summarizes some soil cleanup standards for plutonium given in pIC/g (picocuries of plutonium per gram of soil and in some instances includes the mrem/yr on which they are based:

Plutonium in Colorado Soil (Average Background)	0.04
1975 CDPH Soil Cleanup Standard	1.0
Iggy Lataor Soil Cleanup Standard (1995)	3.8
Soil Cleanup Standard for Enewetak Atoll Residential (about 1978)	40
DOE, CDPH, EPA (1996) for Rocky Flats (85 mrem)	1429
Johnston Atoll (1988)	15
Wash. State DPH, for Hanford, Sept. 1997, Resrad, (rural residential) (15 mrem/yr)	34
Nuclear Regulatory Commission, Aug. 1994, Residential, (15 mrem/yr)	1.89
Nevada Test Site, public, (<100 mrem/yr)	200

The discrepancy between the other soil cleanup standards and the one developed by local authorities for Rocky Flats is striking. Many believe background levels should be the aim. The Rocky Flats standard is 36,000 times as high as background and 750 times as high as the NRC value.

About 70 parameters must be fed into a RESRAD program to come up with results. This report includes a study of only four of the parameters and concludes that values being used are insufficiently conservative and may cause health effects to be underestimated by factors of 170 to 290.

Background

Plutonium is considered to be a dangerous and poisonous material. It is a man-made element not found normally in nature. Experience with it has been obtained only with the dawn of the nuclear era 1944-1945. The entire earth is now contaminated with this element as a result of atmospheric testing of hundreds of nuclear warheads. Fortunately this "background" contamination of soil is quite low with a mean concentration of about 0.04 pCi/g to a maximum of about 0.08 pCi/g in the state of Colorado. This is unfortunately untrue of the Rocky Flats site. Most of the site is contaminated to levels well above background with readings as high as 12,200 pCi/g having been found.

An intensive discussion has taken place over the course of the last few months about "action levels" of plutonium concentrations in soil at Rocky Flats. The action level is defined as the level to which soil will be cleaned to be in accord with the cleanup agreement concluded by the DOE, EPA, and the CDPHE.

Health Effects

The health effects of radioactive materials are normally evaluated by giving exposure levels measured in sieverts or rems. The acceptable exposures are based on the number of cancers that will be developed for a given exposed population--e.g. 1 cancer per million or 1 cancer per 10,000 people exposed. (The concept is basically an immoral one in that we are asked to judge what is the number of people that we find acceptable for getting a cancer!)

The health effects (the exposure measured in sieverts or rems) cannot be measured directly. They must be determined by long and laborious calculations, replete with uncertainties, from measurable quantities such as the concentrations of radionuclides in the environment or in the soil.

Nevertheless, the health effects themselves have a great deal of uncertainty as shown by the levels of health effects, estimated by authorities, that are acceptable. For example, in England the British have

established an ALARA (as low as reasonably attainable) guideline for plutonium in soil of two mrem/year--said to cause no more than one cancer per million population. Contrast that number with 15 mrem and 85 mrem/year used by the local authorities to determine acceptable levels of exposure to plutonium; with 15 mrem used by the Washington State Department of Health and the US Nuclear Regulatory Commission; and with 100 mrem used by the DOE for the Nevada test site cleanup. The diversity of the acceptable level of health effects (2-100 mrem) is certainly remarkable. We must conclude that the acceptable level of radiation exposure is not known to great accuracy.

Action Levels

"Action levels" are an esoteric name for clean up standards for plutonium in soil. As mentioned previously, very laborious and lengthy calculations are needed to convert soil concentrations to health effects measured in mrem/year (millirem per year). The RESRAD computer model used for setting the soil action level for Rocky Flats used about 70 inputs--all of which had to be estimated, and which may be subject to considerable error.

The result was that 1429 pCi Pu/g (picocuries of plutonium per gram of soil) was deemed to be the soil clean-up standard, producing a health effect of 85 mrem/yr that produced results that were acceptable for people living on such soil. Our previous reports used the value of 651 pCi/g as the action level. However, the level of 651 represents a correction made to the value because of the presence of Americium. Other studies to which we wish to compare the Rocky Flats action level had no stated correction for the presence of other radionuclides. Therefore it is believed that the 1429 pCi/g is comparable to their results.

"Action levels" have been set before. In 1975 the CDPHE set a level of 1 pCi/g (1 picocurie of Pu per gram of soil=2 disintegrations per minute per gram of soil). Since the average background is about 0.04 pCi/g, the CDH level was 25 times as high as background.

According to a paper prepared by M. Iggy Litaor, et al in February, 1995, a level called " the programmatic preliminary remediation goal for residential occupancy scenario" was given as 3.8 pCi/g (126 $Bqkg^{-1}$).

In March we learned of a report called *"The Radiological Cleanup of Enewetak Atoll"* issued by the Defense Nuclear Agency, Washington, D. C. 1981. This document is a very detailed description of the studies made to determine soil cleanup standards and the cleanup levels actually obtained in the islands of the Enewetak Atoll. It could serve as a primer for the regulating authorities charged with the cleanup of Rocky Flats. This report which contains in excess of 350 pages is charged with data applicable to the clean up of soil at Rocky Flats.

The first recommended cleanup standards proposed by Lawrence Livermore Laboratories were 10pCi/g of transuranic elements (mainly plutonium) for soil to be used for residential purposes, 20pCi/g for soil applied to agriculture, and 40pCi/g for land used for intermittent food gathering. For reasons not made completely clear, a second study was made by the Bair Committee (composed of knowledgeable scientists) who finally, after much study came up with standards that were used for cleanup of 40 pCi/g for residential areas, 80 pCi/g for agricultural areas and 160 pCi/g for areas restricted to intermittent food gathering.

Since the last issue of this report, we have learned of other studies and action levels for clean-up of plutonium in soil.

A paper by E. T. Bramlitt, of the Defense Nuclear Agency, "Plutonium Mining for Cleanup", Health Physics, Vol 55, No. 2 pp451-453, describes experimental work done to clean the Johnston Atoll soil from 1000 pCi/g to less than 15 pCi/g. The implication is that the required level of cleanup was down to 15 pCi/g. Please note that if the Rocky Flats action level was accepted no cleanup at all was required.

The Washington State Department of Health issued a document "Hanford Guidance for Radiological Cleanup", September 1997. That document proposes that for rural residential exposure, resulting in 15 mrem/year dose, the soil must be cleaned to a level of 34 pCi of Pu239/g. If other radionuclides are present the level must be correspondingly reduced. The level of 34 pCi/g is directly comparable to the level of 1429 promulgated by Rocky Flats. It is 42 times lower.

In August, 1994, the US Nuclear Regulatory Commission issued a document (NUREG-1500) called "Working Draft Regulatory Guide on Release Criteria for Decommissioning..." On page B-20, in a table, in a column headed

"concentration @ 15 mrem/y, residential scenario, (pCi/g)" the value for 239Pu is given as 1.89!!!

June 1997, the USDOE at the Nevada Test Site issued a document entitled "Radiological Dose Assessment for Residual Radioactive Material in Soil at the Clean Slate Sites 1, 2, and 3, Tonopah Test Range". The conclusion of that document was that cleanup of Plutonium 239 to a level of 200 pCi/g will produce a health exposure of no more than 100 mrem/yr to any citizen exposed on that soil.

A table on the next page summarizes all the soil cleanup standards discussed.

Since readings of as high as 12,210 pCi of Pu/g of soil are reported at Rocky Flats (300,000 times as high as average background), there is no question that cleanup is necessary. The question is how much. Some people have strongly recommended cleanup to background levels. The CDH at one time opted for levels that were 25 times that of average background. The level given in the Litaor paper was 95 times as high as average background.

The EPA, the DOE, and the CDPHE clean-up standardof1429 pCi of Pu 239/240 per gram of soil is far higher than any other found up to now. The proposed "action level" is 36,000 times as high as background. It is also 1400 times as high as the Colorado Department of Health guideline of 1 pCi/gm. The proposed action level is 376 times as high as the one discussed in the Litaor paper of a year ago. It is 36 times as high as the level used for the cleanup of the soil for residential use in the Enewetak Atoll; 95 times the level developed for the Johnston Atoll; 42 times as high as the Washington State DPH proposed standard for Hanford; 760 times as high as the standard proposed by the Nuclear Regulatory Commission; and 7 times the level of cleanup proposed for the Nevada Test Site.

The only real clue that we have of the probable cause of such increases is the concluding sentence of the Litaor paper, before the conclusions: "The cleanup of such a large area (1,469,110 m^2 at 80% probability) (*down to the action level of 3.8 pCi/g*--JG italics) is probably unrealistic in terms of cost, waste generation, and land reclamation to minimize slope erosion that must follow such a large scale removal of the top soil."

SOIL CLEANUP STANDARDS

	Pu pCi/g
Plutonium in Colorado Soil (Average Background)	0.04
1975 CDPH Soil Cleanup Standard *(25 times Background)*	1.0
Iggy Litaor Soil Cleanup Standard (1995) *(95 times Background)*	3.8
DOE, CDPH, EPA (1996) For Rocky Flats) *(36,000 times Background)*	1429
*Soil Cleanup Level Proposed for Enewetak Atoll	
Lawrence Livermore--Residential	10
Ditto --Agricultural	20
Ditto--Food Gathering	40
*Soil Cleanup Levels--Actually Used--Enewetak Atoll	
Proposed by Bair Committee	
Residential	40
Agricultural	80
Food Gathering	160
Cleanup at Johnston Atoll (1988)	15
Washington State Dept. of Health--For Hanford Guidance (Sept. 1997) (Resrad) (15mrem/yr) Rural Residential	34
Working Draft Regulatory Guide US Nuclear Regulatory Commission (Aug. 1994) Residential Scenario, 15 mrem/yr	1.89
USDOE, Nevada Test Site, Radiological Dose Assessment for Cleaned Soil, June 1997	
Previous Studies Cited	
Layton Study (1993) Resident farmer scenario, 20 mrem/yr	200
Rutz et al (1994) 100 mrem/yr (resident farmer scenario ?)	270
Lawrence Livermore, Worker 2,000 hrs/yr, 100mrem/yr	270
Idaho Nat. Eng. Lab., resident farmer, 100 mrem/yr	300
Tan et al, resident rancher scenario, 100 mrem/yr, 1995	270
For this study:	
To insure <100 mrem/yr for a member of the public	200

• From "The Radiological Cleanup of Enewetak Atoll" Defense Nuclear Agency, Washington, D. C. 1981

Prepared by J. Goldfield
November 15, 1997

There are no studies cited or costs given to justify this conclusion.

Derivation of the Soil Action Level

The latest soil action level of 1429 pCi/g is derived by means of a calculation using a computer program called RESRAD. Seventy different inputs must be fed into the program. Based on these inputs a soil action level is derived that purports to give a health exposure of mrem/year. In this case--85mrem/year.

The only reason to resort to this awkward and roundabout method is that the previous action levels produced soil removal requirements that were considered to be too costly. The bias in the direction of producing action levels that are less costly is therefore overwhelming.

The trouble with the calculated action levels is that elements of the 70 input parameters have large sources of error. It would not take many such errors or non-conservative estimates to produce enormous changes in the final result--producing large increases in the health effects due to soil contamination of 1429 pCi/g.

Some of the errors produced by a relatively small number of the seventy paramenters are given below. (See items marked 3, 5, 5a and 7.)

Questions Raised by "Action" Level

1. Is there anywhere on the face of the earth where people in residential areas have been exposed to such concentrations of plutonium and americium in soil? This question is extremely important because such exposure could be used to study the health effects directly and limit much of the anxiety and apprehension of citizens who may be exposed to such levels at Rocky Flats. This question was posed to the DOE but received no direct reply. They cited studies made of other types of exposures such as the victims of the Hiroshima and Nagasaki bomb blasts but did not cite any direct evidence provided by people living on soil contaminated with 1429 pCi/g.

2. Has any study ever been made of the health effects of such exposures over a period of years? This question was also answered by the DOE. Since

no equivalent exposure could be cited, the health studies cited above plus other exposures that are even further afield were cited.

3. Errors Caused by Using Average Concentrations in Health Studies

The concentrations in soil are determined (it is my understanding) by taking averages of soil readings. The following factors cause *understatement* of the health effects:

a. Using an average soil concentration means that half of the soil area is contaminated with more than 1429 pCi/gm. Half the population is exposed to higher levels.
b. If the distribution of soil concentration readings is normal, there are probably peak concentrations that are three times as high.

A case in point may be found in the paper cited above by Litaor. He gives the results of a study of background Pu levels in soil made by Purtymun et al. The mean level of Pu was 1.13 Bq Kg^{-1} but the maximum was 2.99 Bq Kg^{-1}--2.7 times as high.

A case that I can recall that shows the tragic consequences of using averages is based on an experience with standards for the control of asbestos health effects. In the United States, when efforts were being made to set asbestos exposure limits, a limit of two fibers per cc was being discussed as the one that had been used in England and was to be copied in this country. In this country, in accordance with OSHA regulations the limit of two fibers per cc meant that no worker should be exposed to a concentration (TWA) of greater than two fibers per cc. The regulators were thrown into some turmoil when it was discovered that a limit of two fibers per cc in England still allowed an unacceptable level of asbestos related disease among workers. The problem was not solved until, upon investigation in England, that their limit of 2 fibers per cc meant that that was the average concentration in an entire operation. Some of the workers were being exposed to concentrations of more than six fibers per cc. When the health records of workers exposed to no more than two fibers per cc were examined, far lower levels of health effects were discovered.

4. On the face of it the number of 1429 (the cited action level) is subject to serious question. The simple statement of the number implies an

enormous precision that I am sure is not there. 1421 states that the methods of obtaining samples, the analytical methods employed, the number of samples collected and the range of the results are so accurate that we know the average soil concentration down to one part in 1429 (±1). Such precision is not credible. A more likely value is 1500±200. We cannot judge until all the methods of collecting samples, the test method used, and all the individual readings on which the number is based are disclosed.

5. Plutonium is Concentrated by a Factor of 5.5 in Respirable Particles

Dr. Carl Johnson wrote an article that appeared in Science, August, 1976. He showed that plutonium was concentrated by a factor of 5.5 in the respirable fraction of soil compared to background level concentrations (0.45 dpm/gm compared to 0.08 dpm/ gm). Data has been presented that all of the plutonium in soil at Rocky Flats is in the respirable range (0.08 to 2.0 microns). There is every reason to believe that the same factor holds for the soil at Rocky Flats. Thus, the respirable fraction of the soil at Rocky Flats has 5.5 times as much plutonium as the overall soil sample. The respirable fraction is also in a size range that is most readily air-borne and dispersed.

In the DOE response to this question the statement is made that "Only 36% of the air concentration is considered to be below 10 microns in size." That question is very important. 10μ particles are considered to be the limit of the respirable portion of air paticulates. If the DOE has data to justify this, I'd like to see it. Particles of 10μ or more in size have very significant settling rates. Stokes Law calculations show that particles of 10μ size settle at a rate of 0.3 cm/sec. In one minute they will settle 18 cm or six inches. In 12 minutes they will settle six feet. Larger particles have correspondingly greater settling rates. Except for periods of great atmospheric disturbance the air will cleanse itself of particles greater than 10μ rapidly.

5a. Concentration of Particulates in Air at Rocky Flats

The RESRAD calculation of health effects has to translate the soil plutonium level to the amount of particulate carried into the lungs of a resident. The first part of this question dealt with the fact that the plutonium is concentrated by a factor of 5.5 in respirable particles.

However, the concentration of particulate in air fed into the RESRAD program directly translates into health effect calculations also.

In the draft called "Action Levels for Radionuclides in Soil for the Rocky Flats Cleanup Agreement" August 2, 1996, on page A-11 the Mass Loading parameter (the concentration of soil particles in air) is set at 18μ/m^3 (0.000018 grams/m^3). This value was obtained by using PM10 samplers. This parameter is subject to tremendous doubt ! I have a publication called "Air Quality Criteria for Particulate Matter" issued by the US Department of Health, Education, and Welfare, National Air Pollution Control Administration Publication No. AP-49 that has a table of "Suspended Particle Concentrations (1961 to 1965)". That table shows values for 60 to 70 cities of the "geometric mean" of the total particulate in those cities. Values range from a low of 58 to a high of 180 μg/m3. The value for the city of Denver is shown as 140 μg/m3. Except for remote, wilderness areas, no values as low as 18 can be found.

Although these values are total particulate, there is considerable evidence that the largest proportion are particles below 5μ. The publication cited above also makes the point that samplers, that use cyclones to remove large particles, like PM10 samplers, have a great tendency to report low results because the cyclones remove a relatively large percentage of the small particles as well.

Is there data to show the particle size distribution of the cyclone catch in the DOE PM10 sampler? Because of the bias of the PM10 sampler and the fact that rapid settling of particles over 10μ in size takes place, I must conclude that the concentrations of particulate in Rocky Flats atmosphere has been understated by a factor of three to five making the most likely concentrations 50 to 90 $\mu g/m^3$.

Since this concentration directly affects the final conclusion of the mrem effect of the soil Pu concentration, this item alone will raise the estimated mrem due to the soil action level by a factor of three to five

6. Has the fact that some of the residents may be toddlers who crawl in intimate contact with the soil? Some children are "pica" eaters. They ingest soil. Has that type of exposure been accounted for?

The answer by DOE claims that the RESRAD model includes the ingestion of

soil by children.

7.Breathing Rates of Exposed Individuals

The publication "Action Levels for Radionuclides in Soils for the Rocky Flats Cleanup Agreement" issued by DOE, EPA, and CDPHE has data on page A-11 that shows breathing rates assumed for calculating the health effect of the action level.
It shows:

a. For a resident--7,000 m^3/yr--20 m^3/day = 13.9 l/min (liters per minute)

b. For a visitor to the open space (1.4m^3/hr) = 23.3

c. For an office worker--0.83 m^3/hr = 13.9

In the publication "Air Quality Criteria for Particulate Matter" previously cited, there is a table on page 9-10 "Respiratory Airflow Patterns for a Group of Healthy Young Men". That table is reprinted from a study " Air Flow Measurements on Human Subjects With and Without Respiratory Resistance at Several Work Rates" Arch. Ind. Hyg., vol. 3, pp 461-478, 1951.

This table shows that the maximum breathing rate for healthy young men, was 40 l/min. for the subjects when sedentary--doing no exercise. It rose to 100 l/min. at exercise rates of 622 kg-m/min. and to 286 l/min. at an exercise rate of 1660 kg-m/min. Maximum rates are appropriate to use because we are trying to protect all people in a population --not only average people. The data from this table indicates that my previous estimate of the appropriate breathing rate to use--48 l/min. is not sufficiently conservative. It does not account for healthy young men performing some moderate exercise. It is also obvious that the breathing rates chosen by the DOE, EPA, and the CDPHE are seriously understated. The amount of plutonium and americium being inhaled will be seriously understated for large sections of the exposed population.

Retaining my admittedly low estimate of 48 l/min as the appropriate figure to use increases the DOE proposed rate of 13.9 by a factor of 3.5.

Conclusion--The health effect may be understated by factors of 3 (average soil concentration versus peak); 5.5 (because of concentration of Pu in respirable fraction); 3-5 (because of underestimate of particulate concentration in inspirated air); 3.5 (because of low estimated breathing rate).

3x5.5x3x3.5 = 170
3x5.5x5x3.5 = 290

The effect of raising the four parameters described in the above report will increase the mrem, due to soil action levels, of exposed individuals by 170-290 fold.

City of Broomfield

One DesCombes Drive, Broomfield Colorado 80020

Fax Cover Sheet

DATE: November 6, 1997
FROM: Kathy Schnoor, Environmental Services Phone: 438-6363
TO: Distribution List
RE: Invitation - Rocky Flats Soil Action Level Review

		Fax No.
Adams County Commissioners		659-0577
Adams County Administrator		659-0577
Boulder County Commissioners		441-4525
Boulder County Health Dept	Jeff Zayach	441-1468
Jefferson County Commissioners	Michelle Lawrence	271-8941
Jefferson County Administrator	Ron Holliday	271-8941
Jefferson County Health Dept	Ken Starr	271-5702
Arvada City Manager	Craig Kocian	431-3085
Arvada	Maria VanderKolk	431-3911
Arvada	Jim McCarthy	431-3969
Boulder City Manager	Stan Zemler	441-4478
Boulder	John Tayer	441-4478
Louisville Mayor	Tom Davidson	673-9043
Louisville City Manager	William Simmons	673-9043
Northglenn City Manager	Jim Landeck	450-8708
Northglenn	Kipp Scott	451-0994
Superior Town Manager	Bruce Williams	499-3677
Thornton City Manager	Jack Ethridge	538-7562
Thornton	Bud Hart	288-0026
Westminster City Manager	Bill Christopher	430-1809
Westminster City Council	Sam Dixion	429-5113
Westminster	Mary Harlow	650-1643

cc: Jeremy Karpatkin, DOE 966-3710

Number of pages including cover sheet: 7.

If all pages are not received or are not received clearly, please contact Diane Eismann at 438-6360.

153

City of Broomfield

ONE DESCOMBES DRIVE BROOMFIELD, CO 80020 (303) 469-3301

November 6, 1997

Interested Local Units of Government:

Over the last year, stakeholders adjacent to Rocky Flats have expressed concerns about the soil clean up standards established by the State of Colorado, the US DOE, and the US EPA. In response to our concern, the US DOE has agreed to fund an independent scientific review of the standards and the models used to establish them. Local governments have been asked to designate no more than six members to an oversight panel which will monitor the activities of a scientific contractor. We are writing to ask of your interest in participating in the process. Please nominate either a staff member or elected official from your community to be considered for panel membership. Selected members will be required to designate an alternate.

Attached is the current draft description of this project. Your community's participation will likely require an average of one meeting per month for the next year. Please contact Kathy Schnoor at the City of Broomfield at 438-6363 if you would like to have a member of your community considered for the panel.

Sincerely,

Hank Stovall
Broomfield City Council

Attachment

cc: Mayor William M. Berens
Jeremy Karpatkin, US DOE

Review of Radionuclides in Soils CleanupAction Level Modeling
Draft Project Description
October 31, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels. The purposes of the evaluation are to independently analyze the soil cleanup action level (for transuranic elements in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted by acknowledged experts chosen by the panel.

An oversight panel will be formed and will consist of a combination of local government, federal and state regulators, and interested citizens. Over a twelve to fifteen month period - from the time of contract award - the group will, through CDPHE, contract with appropriate professional specialists to assess the appropriateness of the current RESRAD model and any alternative models.

The results of this investigation and evaluation will be shared with the RFCA principals to provide additional guidance in the ongoing refinement of soil action levels and the design of An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor.

2.0 Process and Administration

2.1 Project Administration

The Colorado Department of Public Health and Environment, through the office of the Rocky Flats Health Advisory Panel, will serve as the administrative conduit for allocation of the monies, administration of the contract and secretarial and organizational requirements of the oversight panel.

2.2 Establishment of the Oversight panel

The community-based oversight group shall be called the *Rocky Flats Radionuclide Soil Action Level Oversight Panel.* The Oversight Panel shall consist of the following members:

- Six members of local government. The members shall be self-selected by the consensus approval of interested local governments
- Two members of the public interest community. Members shall be self-selected by the consensus approval of interested public interest groups.
- Three representatives from the Technical community to include one representative from the HAP. Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.

- Two members of the general public. Representatives shall be selected by the interim adhoc group after a public notice and review of candidates.
- One member of the RFCAB. Member shall be nominated by the CAB.

Ex-officio members: U.S. Department of Energy
U.S. Environmental Protection Agency
Colorado Department of Public Health and Environment

An Interim adhoc group consisting of the following members will convene to guide creation of the full panel. The interim panel consists of the following representatives; City of Broomfield (Hank Stovall and Kathy Schnoor); City of Westminster(Sam Dixion and Mary Harlow); The Peace and Justice Center (LeRoy Moore); CAB (Victor Holm and Ken Korkia); Ex-officio (DOE - Steve Slaten; Kaiser-Hill - Dave Shelton and John Corsi); CDPHE - Norma Morin and Ed Kray).

2.3 Selection of a Contractor(s)

The oversight panel shall oversee the refinement of the Principal Investigation and Evaluations Questions (described below - 3.0) to be addressed by outside contractors. The panel shall utilize the expertise of a contractor or contractors to conduct the research needed to address the Principal Investigation and Evaluation Questions. An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning the contractor.

2.4 Process Management

All meetings shall be advertised and open to the public. The general public shall be encouraged to provide input to the panel. The panel shall strive for consensus, but when necessary, work by the process of majority vote. CDPHE will assist the panel in drafting the necessary documents and the RFP. In addition to administrative services, CDPHE will plan and promote meetings, serve as a liaison between the panel and the contractor and help disseminate information and results. DOE and Kaiser will work to ensure full access to all available data and relevant documentation. The Oversight panel will not be paid.

2.5 Relationship to the Actinide Panel

The RESRAD model limits its review to on-site impacts. The primary scope of the research will be the review of the RESRAD model, but many stakeholders believe that the impacts on off-site migration of radionuclides is of highest concern. Therefore, the ongoing research of the Actinide migration panel and site investigations into the short and long-term migration and fate of the actinides should be woven into the contractors activities as appropriate for addressing the Principal Questions. Because the Actinide Panel is addressing the potential for surface water migration off-site, the Oversight Panel should coordinate and incorporate the Actinide panel results into the timing of the activities of the contractor. It is expected that the contractor will meet at least once with the actinide migration investigators to share information

and coordinate efforts as appropriate and that the oversight panel will be kept fully appraised of the activities and results of the actinide migration investigators.

3.0 Principal Investigation and Evaluation Questions

Described below are the specific research questions to be answered by the project. These questions will provide guidance in the development of an RFP, and serve as the basis for negotiation of a final scope of work with the winning contractor(s).

a. What are the various models which can be applied to the study of the impacts of plutonium in Rocky Flats soils, including the RESRAD model? Analyze these models to determine which ones are best suited for the site-specific conditions of Rocky Flats.

b. What are the model input parameters and assumptions being applied for the existing models in use at Rocky Flats? Are these input parameters accurate and credible in simulating soil conditions and associated dose and risk. Each of these parameters should be commented upon as to distribution of possible values, from most conservative to least conservative (including a "reasonable" value), and the sensitivity of these parameters to the final result.

c. By applying the best available soils model and appropriate input parameters, as well as the methodology or methodologies as defined in the RFP, how will the model results impact the translation of dose and risk to soil action levels?

d. What processes/models have been used to determine cleanup levels at other plutonium contaminated sites and do these processes/models have application for use at Rocky Flats.

4.0 Special Issues

Below is a list of issues for the panel and the contractor to keep in mind as the final scope of work is negotiated. This list is a compilation of concerns and working assumptions expressed by stakeholders, DOE, Kaiser-Hill, CDPHE and EPA to provide a backdrop for the final design of the scope of work.

4.1 **Establishment of the RSAL**: Under the Rocky Flats Cleanup Agreement, the RFCA principals agreed upon the current RSAL to establish interim soil action levels for radionuclides (primary plutonium and americium) to be protective of people using Rocky Flats after site closure. The RSAL did not consider off-site migration. These RSAL's are to undergo periodic review as new information is available.

4.2 **Water Quality Standards:** The 0.15 pCi/L surface water standard for plutonium and americium were adopted by the Water Quality Control Commission to

protect all off-site use of water both during and after closure. The RFCA principals believe that the application of the RSALs to the site will result in actinides remaining in low concentrations in the soils. Stakeholders believe that the synergy of surface/groundwater to soils should be considered in the review of input parameters in the RESRAD or other models.

4.3 **Off-site Migration:** Recognizing the lead role of the actinide panel, stakeholders appreciate the potential for long-term off-site migration either through air, water or soil, and believe that a new or improved soils model should strive to integrate multi-media considerations. Some stakeholders believe that by applying ALARA principles, actinides can be minimized and immobilized in order to reduce off-site migration.

4.4 **Input Parameters:** To ensure that the contractor will quantitatively address the research questions and in order to minimize the subjective level of interpretation on how the input parameters should be applied, the scope of work and the contractor must strive to identify, at the onset, the method by which input parameters are applied or tested. Among others, choices include: Best estimate method, conservative method, bounding method, and probabilistic risk assessment method. Specifically, stakeholders are concerned that the 561pCi/gram action levels is high. Likewise, DOE is concerned that maximizing the conservatism of all input parameters could result in a model that lacks "reasonableness".

4.5 **Uniquie Site Specific Conditions:** The RFCA operates under the assumption that cleanup activities and cleanup levels will allow for a future land use scenario of ???? This assumption, as well as off-site land use developments, provide an important backdrop for the application of a preferred model. In addition, other issues impacting soils include: community acceptance of institutional controls; the prospect for deployment of innovative/cost effective soils remediation technologies; the opportunity for off-site disposal of soils and building rubble; and, the importance of buffer zone preservation and critical habitat. All these issues, many of which are in flux, should be recognized when judging the applicability of the RESRAD or other models at Rocky Flats and the adequacy or appropriateness of the model inputs.

4.6 **Quality Assurance:** Quality assurance is critical to ensure that the contractor results are credible, believable and consistent with established practices for analysis of radionuclides. The scope of work must ensure appropriate quality assurance and peer review protocals.

5.0 Timeline:

General Timeline: - 12 to 15 months from date of contract.

October to December, 1997	- Convening of oversight committee; refinement of scope of work and development and issuance of RFQ.
January, 1998	- Award of contract.
March to Dec, 1998	- Contractor performs scope of work with quarterly technical review meeting with the panel and the public.
Jan to March, 1999	- Final report (Panel review and peer review)

6.0 Estimated Cost:

$800,000 to $1,500,000	* Preliminary estimates by CDPHE

PURCHASE REQUISITION

City of Broomfield, Colorado

Requisition Date: 11/4/1997 Purchase Order #

PETTY CASH:	Cash Advance		Purchases & Reimbursement	XXX	Check Req.		Purchase Order	

[redacted]or: Safeway

Department/D . Public Works/Environmental

Attention:

Attention: Kathy Schnoor Phone No./Ext.: 303-438-6363

Address:

Delivery Address: One DesCombes Drive

Broomfield, CO 80020

Phone: Date Quote Received: Requested Delivery Date:

Quantity	Unit	Description	Unit Price	Amount	Account Code
		pop and paper plates for Soil Action Level Work Group Meeting		$ 5.27	4.433.4.23

SAFEWAY 466-7969
6775 W 120TH AVENUE

COCA COLA 1.69 T
COCA COLA 1.69 T
PAPER PLATES 1.89 T
TAX .22

BALANCE DUE 5.49
TAX .37

BALANCE DUE 5.27
TAX EXEMPTION -.22

CHECK 5.27

/04/97 09:10 1146 06 0014 104
'WE VALUE OUR CUSTOMERS'
'THANK YOU'

TOTAL $ 5.27

Quotes Received from Other Vendors:

1. Vendor:

Quote: Date Rec'd:

Phone: Contract:

2. Vendor:

Quote: Date Rec'd:

[redacted]ne: Contract:

Explanation - Intended Use for Materials, Goods, Services:

Sole Source Purchase Explanation:

[redacted] ORIGINAL PURCHASE ORDER TO:

Sole source Purchase Approval - P.S. Dept. C. Manager

Kathryn K. Schnoor 11/4/97
Purchase Requested By:

Mike Bartleson 11/4/97
Approval of Department Head/Designee Date

161

BROADCAST REPORT

DATE/TIME 11- 7-97 12:24PM
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LOCAL NAME CITY BROOMFIELD
LOGO CITY BROOMFIELD

START TIME 11- 7-97 9:57AM
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163

12/12

City of Broomfield

One DesCombes Drive, Broomfield Colorado 80020

Fax Cover Sheet

DATE: December 10, 1997
FROM: Kathy Schnoor, Environmental Services Phone: 438-6363
TO: Distribution List
RE: Rocky Flats Soil Action Ad-Hoc Group

			PHONE	FAX
1	David Abelson	Cong. Skaggs' Ofc	650-7886	650-7893
2	Jackie Berardini	CDPHE	692-3472	782-0095
3	Deanne Butterfield	RFLII	940-6090	940-6088
4	Jeff Ciocco, Jim Fiore, Ray Greenberg	DOE HQ	(301) 903-7459	(301) 903-3877
5	John Corsi	Kaiser Hill	966-6526	966-6153
6	Sam Dixion	City of Westminster	426-1202	429-5113
7	Joe Goldfield	RFCAB-SNM	321-7276	
8	Mary Harlow	City of Westminster	430-2400 x 2174	650-1643
9	Tim Holeman	City of Broomfield	355-5492	355-5530
10	Victor Holm	RFCAB	989-9086	980-9076
11	Bob Kanick	RFCAB	444-0049	444-0072
12	Jeremy Karpatkin	DOE	966-2080	966-6633
13	Ken Korkia	RFCAB	420-7855	420-7579
14	Edd Kray	CDPHE	966-2115	966-5449
15	Tom Marshall	RFCAB	444-6981	444-6523
16	LeRoy Moore	RMPJC	444-6981	444-6523
17	Dr. Norma Morin	CDPHE	692-2645	782-0188
18	Tim Rehder	EPA	312-6293	312-6067
19	Jessie Roberson	DOE/RFFO	966-2025	966-6054
20	Kathy Schnoor	City of Broomfield	438-6363	438-6234
21	Dave Shelton	Kaiser Hill	966-9877	966-5001
22	Steve Slaten	DOE	966-4839	966-3710
23	Hank Stovall	City of Broomfield	466-5986	469-8554
24	Steve Tarlton	CDPHE	692-3423	782-4969

Number of pages including cover sheet: 8.

If all pages are not received or are not received clearly, please contact Diane Eismann at 438-6360.

165

F-A-X M-E-M-O-R-A-N-D-U-M

TO: DISTRIBUTION

FROM: HANK STOVALL

SUBJECT: MEETING REMINDER FOR FRIDAY DECEMBER 12

DATE: DECEMBER 10, 1997

There will be meeting **Friday 1:00-3:00 PM at Broomfield Municipal Center** in the Zang Spur Conference Room (in the basement). There are two very important topics to be covered at this meeting: The selection process for the Oversight Panel and a discussion of the attached DRAFT Scope of Work for the independent scientific review.

Proposed Agenda

- Introductions
- Oversight Panel Selection Process and Timeline
  - -Oversight Panel recruitment status
  - -appointments by local government and public interest groups
  - -selection committee
  - -selection criteria for technical experts
  - -selection criteria for citizen members
- Draft Scope of Work
- Other Items:
  - -CDPHE update-RSAL review fit with RAC contract
  - -Outline state process and timeline to get work started
  - -Funding
- Next Steps

166

F-A-X M-E-M-O-R-A-N-D-U-M

TO: DISTRIBUTION

FROM: HANK STOVALL

SUBJECT: MEETING REMINDER FOR FRIDAY DECEMBER 12

DATE: DECEMBER 10, 1997

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Proposed Agenda

- ✓ Introductions

2 •
- Oversight Panel Selection Process and Timeline
  - X Oversight Panel recruitment status
  - X appointments by local government and public interest groups
  - X selection committee Hank, Sam, Ken, LeRoy, (?) 14-3 13-3
  - X selection criteria for technical experts
  - X selection criteria for citizen members

~~Thurs~~ Fridays 19th 9 AM Brmfld

1 • Draft Scope of Work - turn it over to the Panel w/ comments

- Other Items:
  - CDPHE update-RSAL review fit with RAC contract
  - Outline state process and timeline to get work started
  - Funding

Minimize can't be here

- Next Steps

- Mtg of Selection Committee get them a room, coffee, etc.

Next Mtg - have a discussion of NAS — need comments to Deane by Tues.

167

SHEET NO. ..... OF .....

JOB NO. SAL Mtg

BY KS

DATE 12/12/97 TIME 1-3 PM

City of Broomfield

One DesCombes Drive • P.O. Box 1415 • Broomfield, Colorado 80020

Scope of Work

Joe Goldfield -

Purpose - of Study Joe's paragraph
- also a TP that allows days as more info. is known

Jeremy - We are committed to funding Study Some issues in hand-out problems w/ Sec 6 & 8

- how can this panel be worked into public participation of Actinide Migration Panel

- selection committee -

- selection criteria technical experts

Comments to Deanne by Tuesday

Next Mtg for 2nd week in January -

~~Thursday 8th~~ Tuesday
Oversight Panel Mtg
Tuesday 13th 12:30 - 2:00
~~Jerry Spur Rm~~

Set up an education mtg
Primer on radiation

SAL 12-12-97

Name	organization	Phone / Fax
Tim Rehder	EPA	312 6293/60
Ken Korkia	RFCAB staff	420-7855/757
Bob KANICK	RFCAB member	444-0049 / 0072
Victor Holm	RFCAB	989/9086
KATHY SCHNOOR	City of Broomfield	438-6363/438-62
Will Neff	RFLII	940-6090/-6088
EDD KRAY	CDPHE	946-2115 / 542
Steve Slaten	DOE	966-4839 / 37
Jeremy Karpatkin	DOE/DOE	966-2080/6633
John Corsi	Kaiser-Hill	966-6526 / 6153
Carl Spreng	CDPHE	692-3358 / 759-5355
HANK STOVALL	CITY OF BROOMFIELD	466-5886 / 469-
Mary Harlow	City of Westminster	
Joe Goldfield	RFCAB	321-2276
LeRoy Moore	RMPJC	444-6881/444-6523
Dave Shelton	K-H	966-9877/5001
Tom Marsall	RMPJC / RFCAB	444-6981 / 6523
Sam Dixon	Westminster City Council	

Draft RFP for SAL Independent Review

Background

As the concluding step of the Rocky Flats Cleanup Agreement (RFCA), on October 18, 1996, the U.S. DOE and its regulators (EPA and CDPHE) at the Rocky Flats Environmental Technology Site (RFETS), a former nuclear weapons production facility located in Jefferson County, CO, adopted interim Radionuclides in Soil Action Levels (RSALs), which is to say cleanup levels, for radionuclides in the soil at the RFETS site (Attachment A). Intended to be protective of people using the RFETS site after closure. the RSALs specify how much radioactive material (primarily plutonium and americium) may remain in the RFETS soil after cleanup without exceeding permitted exposure levels (dose) for targeted persons. The RSALs did not consider off-site migration. As part of RFCA, the RSALs are to undergo periodic review as new information is available.

The RSALs were calculated based on the dose assumptions given in RFCA. The calculations to determine how much radioactive materials in the soil corresponds to the permitted dose were performed by entering the more than 70 input parameters and default values into Argonne National Lab's RESRAD computer program.

In response to public concerns regarding these RSALs, DOE agreed to this independent review of the methods used to convert given dose levels to soil contamination levels as used in setting the RSALs. A citizen review group known as the Rocky Flats Radionuclide Soil Action Level Oversight Panel (RFRSALOP) was created to define the project, to issue this Request for Proposal (RFP) to interested parties, to contract for the independent review, and to oversee the review from initiation to completion. CDPHE, through the office of the Rocky Flats Health Advisory Panel (HAP), will serve as the administrative conduit for allocation of monies, administration of the contract, and provision of secretarial and organizational support for the RFRSALOP. Accordingly, the present RFP is issued by the HAP office of CDPHE.

Scope of Work

The contractor is being requested to investigate three things. First, to review models, methodologies, and cleanup levels that may exist or are being developed for other radionuclide-contaminated sites as to how they may apply to the RFETS site-specific situation. Second, to review the existing analysis used to set the current RFETS RSALs as to its accuracy and applicability. And third, based on the results of the above investigations, to calculate an independent set of RSALs.

The contractor will be expected to submit a comprehensive final report as well as to publish the study in a reputable peer review journal.

The study will use existing RFETS site data to the maximum extent possible. It is expected that this data will be both sufficient and of acceptable quality to complete the study. It will be the responsibility of the contractor to determine the sufficiency and quality of this data and informing the RFRSALOP at an early date if additional data is required.

The contractor may suggest that the scope of study be modified however, at a minimum, proposals are requested to address the issues as discussed above. Specifically the contractor will be asked to perform the following:

1. Cleanup Levels at Other Sites

Action:

Identify and evaluate cleanup levels (i.e., RSALs) which exist or are projected for use at other radionuclide-contaminated sites and the processes/models used to determine them as to their applicability in setting cleanup levels at RFETS. Provide a summary of this evaluation itemizing the reasons why such limits models are or are not applicable for use in setting cleanup levels for RFETS.

Discussion:

This study should concentrate on examples of soil contaminated with transuranic elements. Of particular interest is the reasoning that went into the setting of these cleanup levels and the subsequent history of the site, including any cleanup. The study should concentrate on published material supplemented by interviews and correspondence. The study should compare the levels within the context of site-specific conditions, projected land use, and the then existing risk assessments and dose standards. This portion of the study will not be used to recommend cleanup levels at RFETS, but will simply be used to place the calculated values in context.

2. Computer Models

Action:

Identify and evaluate all available or emergent computer models which can be used to calculate radionuclide contamination levels in soils based on a given dose rate. The models are to be evaluated to determine which are most applicable and best suited to model the site-specific conditions at RFETS. Provide a description of these models, a summary of the strengths and weaknesses of each, and a recommendation for the most appropriate model(s).

Discussion:

Models that are inappropriate to the RFETS site conditions, obsolete, or which cannot be readily validated should not be included. The RESRAD model must be included due its use in determining the current RSALs. A comparison of the different models using RFETS site-specific data would be useful. The contractor is encouraged to find computer codes capable of modeling both on-site and off-site dose rates. It is possible that no one model will prove satisfactory for determining both, but that a combination of models may be necessary. The contractor will be expected to recommend the most appropriate model(s) for the RFETS site-specific conditions and to justify this recommendation. Whichever model or models are recommended should be thoroughly validated. It is not necessary that the contractor perform this validation; peer reviewed, published studies will suffice. In the event that RESRAD is not recommended, RESRAD should be run in parallel with the recommended model(s) as a comparison.

3. Inputs and Assumptions

Action:

Evaluate the input parameters, inputs, default inputs, and assumptions for the current analysis (RESRAD) used to set the RSALs at RFETS. At a minimum this evaluation must satisfy the following:

a) Are the input parameters, inputs, default inputs, and assumptions accurate and credible in simulating the conditions at RFETS, given the land use scenarios as set in RFCA, and the subsequent conversion to dose rate/contamination levels?

b) For each of the input parameters, what is the sensitivity of the input values in terms of resulting contamination levels?

c) For each of the input parameters, what is the distribution of possible input values. Identify each of these based on the sensitivities determined in 3.b) above from least conservative to most conservative with conservative meaning that which results in lower contamination levels given a certain dose limit.

d) For each of the input distributions in 3.c) above, identify an input value which can be considered "reasonable" or "best estimate". Provide the reasoning for these choices.

Discussion:

All of the input parameters to the model need to be examined. Parameters that are easily confirmed, non site-specific parameters , or those which are specified by the EPA or other regulatory agencies should be noted as such. If the investigation indicates that such values are not appropriate, alternatives should be recommended. For parameters that are site-specific to RFETS, a thorough study of the distribution of possible values should be performed.

4. Methodology

Action:

Identify and evaluate the methodologies which can be used to select or combine the necessary inputs/outputs for a given computer model in determining contamination levels for a given dose limit. Within 1 month of the start of the contract, present to the RFRSALOP and affected stakeholders a summary of these methodologies along with a recommendation and justification as to the best suited for such an analysis. Compare or contrast this recommended methodology with that used in the existing RESRAD analysis.

Discussion:

It is understood that there are several methodologies (e.g., bounding, best estimate, conservative, probabilistic risk assessment, etc.) which can be used to shape the inputs for such an analysis. The question as to "how conservative is conservative?" makes this a subjective rather than simply a scientific issue because the affected communities must accept the risks involved. Therefore, the RFRSALOP wishes to fully understand the nature and implications of each of the potential methodologies to ensure that the methodology chosen can best produce credible and

defensible results from this independent review which will be acceptable to the broadest range of stakeholders.

5. Independent Calculation

Action:

Use the methodology recommended in 4. above to select/combine the inputs identified in 3. above as well as any new inputs required by the model recommended in 2. above in that model to calculate contamination levels for the dose limits set for each of the RFCA land use scenarios assumed in the original analysis. This includes a residential scenario. As part of the calculations, include a statement of the assumptions and level of uncertainty involved in the specific approach utilized. State the dose limits in terms of risk.

6. Protocols

Action:

Specify the sampling method, process protocol, chain of custody (quality controls) for ensuring that subsequent soil contamination measurements are directly corresponding to the cleanup levels that may be set from the use of models and inputs as studied in this investigation.

Discussion:

There is a strong desire to find a scientifically credible method for guaranteeing that the cleanup levels will actually be met in terms of what contamination levels are ultimately measured at the site. This study should clearly delineate such parameters as sample spacing, depth of samples, sampling methods, and all associated quality assurance which ensure that the methods used for measuring contamination before and after any remediation are directly applicable to the parameters used for setting the cleanup levels.

7. Actinide Migration

Action:

The contractor is to meet at least once with the Actinide Migration Panel to share information and coordinate efforts as appropriate in order to ascertain the applicability of any results from the actinide migration studies on the inputs to this modeling for this analysis. The contractor should study these results and any other relevant data and determine what impact these will have on the results such as obtained in 5. above.

Discussion:

It should be determined that cleanup levels are protective of off-site residents. Calculations for the exsiting RSALs only considered on-site exposure scenarios. Since off-site air and water quality standards are more restrictive, it is possible these standards will control the cleanup. How can the issue of plutonium migration be incorporated into an evaluation of the RSALs? An

Actinide Migration Study is currently underway. The final results of this study will not be ready in time to be used in this study. Some preliminary results will however be available. It is understood that any conclusions that can be based on this are tentative pending the completion of the Actinide Migration Study. The collection of new data, laboratory studies, and new research are beyond the scope of this study. The contractor should, however, identify the data needs of this study as early as possible in order to facilitate the collection and analysis of additional data needed.

9. Water Quality

Action:

Subsequent to the evaluation of inputs in 3. and the calculation of contamination levels in 5. above, consider the following: Are the inputs such that the resulting contamination levels will ensure the 0.15 pCi/L surface water standard for Pu and Am adopted by the Water Quality Control Commission are met?

Discussion:

If possible, a time plot of surface water contamination for a range of soil contamination levels should be produced. Based on such an analysis, it is possible that a different level of cleanup may be required for different areas of the site.

Deliverables

The contractor will be expected to produce a final report which is a comprehensive summary of the entire study. The main body of the report should be directed to the level of the educated public. The magazine *Scientific American* could serve as a model for the style and technical level being sought. The contractor may wish to include appendices that include more technical details.

A synopsis of the study and the results are also to be submitted to a reputable peer review journal for critical analysis.

A separate summary is to be provided which should be directed to the general public that has no prior knowledge of the RSALs. This report should be suitable for inclusion in newsletters or general circulation newspapers.

Quarterly progress reports will be prepared for distribution at quarterly meetings. They should include a summary of progress to date, a plan for the rest of the project and draft sections of the final report.

Schedule/Timeline

At the very beginning of the contract, to ensure that the contractor is aware of the concerns of the affected public about this review, the general public will be invited to attend a scoping meeting. Thereafter, quarterly meetings will be held which will consist of two nightly sessions. The first night will be devoted to a technical session summarizing the work to date. The second night will be a

business session where plans and methods of research will be discussed. The contractor will have sufficient staff present to answer any questions. During the day between the meetings, the contractor team is to be available for discussions or technical briefings with panel members or members of the public.

On months that do not include a quarterly meeting, the panel will meet. The contractor will ensure at least one representative is present.

It is desired that the contractor complete the work according to the following schedule and to propose a work schedule as appropriate:

March 1998	Start of contract
April 1998	Presentation of potential methodologies to RFRSALOP
June 1998	First quarterly report to RFRSALOP
December 1998	Completion of contract, final presentations and report
January 1999	Presentation of results for special RFCA review

To: Joe Goldfield
From: V. Holm
Subj: Health Effects of Plutonium Contaminated Soils
Date: December 3, 1997.

The main difference of opinion I have with your analysis is part three "Errors Caused by Using Average Concentrations in Health Studies". You assume that the soil samples are normally distributed. This is almost never the case with small concentrations of elements in geochemistry. The samples are usually log-normally distributed (Fig. 1). The difference is dramatic. For 1691 soil samples analyzed for Pu from Rocky Flats the average was 18.66 pCi/gr. The highest value was 7300 pCi/gr or nearly 400 times higher than the average. Instead of half the samples being greater than the average only 85 samples were over 18.66 pCi/gr while 1606 samples were less. This is 5% of the samples. My point is the average value is a very poor estimator for log-normal distributions. The median, which is the middle sample, is 0.09 pCi/gr. This is a better estimator. The other statement I take exception with is that after the cleanup half the area will still be above the cleanup level. What a cleanup does is truncates the distribution at the cleanup level. There will always be some higher areas that were missed; but, unless the cleanup was completely ineffective the average concentration after cleanup must be less than the action level.

There are three parameters in RESRAD that I believe need to be reviewed. They are:

Dose Conversion Factor (DCF) parameter

This is probably the single most sensitive parameter for the Pu soil action value. It basically measures how much of the Pu inhaled or ingested is absorbed by the body. The value is determined by the chemical form of the Plutonium. It was believed that all the Pu in the soil was in the oxide form. The oxide form is the least likely form to remain in the body for a long period of time; therefore it is the least conservative. If we just consider Pu^{239} the value for 85 mrem is reduced from 1429 pCi/gm to 242 pCi/gm if the form of the plutonium is not oxide. After correcting for the sum of ratios the new Pu soil action level would become 50 pCi/gr for Tier 1 or 15 pCi/gr for Tier 2. It is very doubtful that none of the Pu is in the oxide form therefore these values are too conservative; but, it does show the possible range.

Distribution Coefficient (Kd)

This parameter can be thought of a measure of the mobility of the Pu in the soil. The smaller the number the more rapid the Pu moves. Values between 218 and 20,000 have been suggested, with the smaller number being used in the soil action level calculation and the higher number being suggested by some of the recent preliminary results from the Actinide Migration Panel. The value chosen has little effect on the soil action level for on-site users since the parameter only effects concentration with time, and the soil action level is determined by the concentration at year zero. The parameter does however have an effect on the off-site water quality standard in two ways. If the value is very low (218) then the Pu moves vertically though the soil faster than

the soil is removed by erosion and water quality is not affected by surface runoff or sediment transport. After some period of time however the Pu will enter the groundwater and then the surface water and leave the site, possibly at concentrations greater than the water quality standard. If the Kd parameter is high (>20,000) then erosion of the soil may be faster than the vertical transport of the Pu in the soil. The soil will remain contaminated for a longer period of time and sediment transport will the primary avenue of off-site contamination.

Thickness of the Contaminated Zone

The Pu which contaminated the soil at Rocky flats was deposited as fine particles on the surface of the soil. The soil action levels used 15 cm for the thickness of the contaminated zone which is consistent with what is normally considered as surface soil. Most of the soil samples collected to date from Rocky Flats have utilized either the CDEPH method or the RFP method. These methods sample the top .64 cm and 5 cm of soil respectively. This means that current areas exceeding the soil action level as for instance outlined in Litour et. al. (1995) grossly overestimate the area that actually exceeds the action level. More important if the Pu contamination is vertically stratified the inhalation dose has been underestimated by the current action level.

City of Broomfield

One DesCombes Drive, Broomfield Colorado 80020

FAX COVER SHEET

DATE:	November 20, 1997	**TIME:**	1:56 PM
TO:	Kathy Deckler CDPHE	**PHONE:** **FAX:**	303-692-2630 303-782-0188
FROM:	Kathy Schnoor Public Works/Environmental Services	**PHONE:** **FAX:**	303-438-6363 303-438-6234

RE: Project Description for Rocky Flats Soil Action Level Review

CC:

Number of pages including cover sheet: _6_

Message:

Please find the attached Soil Action Level Review Project Description for CDPHE review.

Project Descrip. agreed to by Larger group & forwarded to CDPHE

- note schedule

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Review of Radionuclides in Soils Cleanup Action Level Modelling
Final Draft Project Description
November 19, 1997

1.0 Project Description and Product

In light of recent events and reappraisal of the establishment of safe levels of residual plutonium in the Rocky Flats soils, the U.S. Department of Energy (DOE) has agreed to support and fund a community-based advisory group to oversee an independent evaluation of radionuclide soil action levels. The purpose of the project is to obtain an independent scientific determination of the appropriate model to be used to set a site specific soil action level for radionuclides in the soils at Rocky Flats and recommend changes appropriate for the protection of future on-site and off-site populations. The evaluation will be conducted and peer reviewed by acknowledged experts chosen by an independent oversight panel.

A thirteen member oversight panel will be formed and will consist of a combination of local government, federal and state regulators, environmental groups, technical experts and interested citizens. Over a twelve month period the group will, through CDPHE, contract with appropriate professional specialists to assess the appropriateness of the current RESRAD model and any alternative models. The panel will review the current model (RESRAD) as well as other available models and provide a determination of which model is most applicable to the Rocky Flats site. Specific attention will be given to the input parameters and the rationale of their use for setting a soil standard that is protective of future site users, including the potential impact to downwind communities and surface waters leaving the site.

Actinide Migration Panel findings will be taken into consideration when determining input parameters. Additionally, a review of standards that have been set both locally and nationally will be undertaken to determine if they have an application for setting a Rocky Flats Standard. The project will focus primarily on soil conditions on-site, and where appropriate will attempt to integrate the Actinide Panel's analysis of the movement, mobility and fate of radionuclides from on-site soils.

The results of this investigation and evaluation will be shared with the RFCA principals to provide additional guidance in revisions to soil action levels. An RFP will be issued and the panel, with the logistical assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning contractor.

2.0 Process and Administration

2.1 Project Administration

The interim group endorses the use of the Colorado Department of Public Health and Environment, through the office of the Rocky Flats Health Advisory Panel, to serve

as the administrative conduit for allocation of the monies, administration of the contract and secretarial and organizational requirements of the oversight panel.

2.2 Establishment of the Oversight Panel

The community-based oversight group shall be called the *Rocky Flats Radionuclide Soil Action Level Oversight Panel* and serve as volunteers. The Oversight Panel shall consist of the following members:

- Six members of local government. The members shall be self-selected by the consensus approval of interested local governments.
- Two members of the public interest community. Members shall be self-selected by the consensus approval of interested public interest groups.
- Three representatives from the Technical community to include one representative from the HAP. Representatives shall be selected by the interim Ad Hoc group after a public notice and review of candidates.
- Two members of the general public most impacted by Rocky Flats. Representatives shall be selected by the interim ad hoc group after a public notice and review of the candidates.
- Ex-officio members:

  U.S. Department of Energy
  U.S. Environmental Protection Agency
  Colorado Department of Public Health and Environment

An interim ad hoc group consisting of the following members will convene to guide creation of the full panel. The interim panel consists of the following representatives; City of Broomfield (Hank Stovall and Kathy Schnoor); City of Westminster (Sam Dixion and Mary Harlow); The Rocky Mountain Peace and Justice Center (LeRoy Moore); Rocky Flats Citizen's Advisory Board (Tom Marshall, Ken Korkia, Victor Holm and Robert Kanick); Ex-officio (DOE-Steve Slaten, Kaiser-Hill-Dave Shelton and John Corsi, CDPHE-Norma Morin and Edd Kray).

2.3 Selection of a Contractor(s)

The oversight panel shall oversee the refinement of the Principal Investigation and Evaluations Questions (described below in section 3.0) to be addressed by the outside contractor. The panel shall utilize the expertise of a contractor or contractors to conduct the research needed to address the Principal Investigation and Evaluation Questions and consideration of special issues (described below in section 4.0). An RFP will be issued and the panel, with the assistance of CDPHE, will select a winning proposal and negotiate a final scope of work with the winning contractor, including provisions for a peer review process.

2.4 Process Management

All meetings shall be advertised and open to the public. The general public shall be encouraged to provide input to the panel. The panel shall strive for consensus and define a process for when consensus is required and when a majority vote is required. The panel will design a public participation process and a stakeholder participation process which ensures early input from interested individuals and stakeholders. CDPHE will assist the panel in drafting the necessary documents and the RFP. In Addition to administrative and co-ordinating services, CDPHE will serve as an administrative liaison between the panel and the contractor and help disseminate information and results. DOE and Kaiser will work to ensure full access to all available data and relevant documentation. The oversight panel will not be paid.

3.0 Principal Investigation and Evaluation Questions

Described below are the specific research questions to be answered by the project. These questions will provide guidance in the development of an RFP, and serve as the basis for negotiation of a final scope of work with the winning contractor(s).

a. What are the various models which can be applied to the study of the impacts of radionuclides in Rocky Flats soils, including the RESRAD model? Analyze these models to determine which ones are applicable and best suited for the site-specific conditions unique to Rocky Flats.

b. What are the model input parameters and assumptions being applied for the existing models in use at Rocky Flats? Are these input parameters accurate and credible in simulating soil conditions and converting dose to RSAL and converting to risk? Each of these parameters should be commented upon as to distribution of possible values, from most conservative to least conservative (including a "reasonable" or "best estimate" value), and the sensitivity of these parameters to the final result.

c. By applying the best available soils model and appropriate input parameters, as well as the methodology or methodologies as defined in the RFP, how will the model results impact the translation of dose to soil action levels and the translation to risk?

d. What cleanup levels exist at other radionuclide contaminated sites and do the processes/models to determine cleanup levels have application for use at Rocky Flats.

4.0 Special Issues

Below is a list of issues for the panel and the contractor to keep in mind as the final scope of work is negotiated. This list is a compilation of concerns and working assumptions

expressed by stakeholders, DOE, Kaiser-Hill, CDPHE and EPA to provide a backdrop for the final design of the scope of work.

4.1 **Establishment of the RSAL**: Under the Rocky Flats Clean up Agreement, the RFCA principals agreed upon the current interim RSAL to establish interim soil action levels for radionuclides (primarily plutonium and americium) to be protective of people using Rocky Flats after site closure. The RSAL did not consider off-site migration. These RSAL's are to undergo periodic review as new information is available.

4.2 **Water Quality Standards**: The 0.15 pCi/L surface water standards for plutonium and americium were adopted by the Water Quality Control Commission to protect all off-site use of water both during and after closure. The RFCA principals believe that the application of the RSALs to the site will result in actinides remaining in low concentrations in the soils. Stakeholders believe that the synergy of surface/groundwater to soils should be considered in the review of input parameters in the RESRAD or other models.

4.3 **Off-site Migration**: The RESRAD model limits its review to on-site impacts. the primary scope of the research will be the review of the RESRAD model, but many stakeholders believe that the impacts of off-site migration of radionuclides is of highest concern. Therefore, the ongoing research of the Actinide Migration panel and site investigations into the short and long-term migration and fate of the actinides should be woven into the contractors activities as appropriate for addressing the Principal Questions. The Panel should co-ordinate and incorporate the Actinide Panel results into the timing of the activities of the contractor. It is expected that the contractor will meet at least once with the actinide migration investigators to share information and co-ordinate efforts as appropriate and that the oversight panel will be kept fully appraised of the activities and results of the actinide migration investigators. The contractor will be encouraged to evaluate new or improved soils models which strive to integrate multi-media considerations. some stakeholders believe that by applying ALARA principles, actinides can be minimized and immobilized in order to reduce off-site migration.

4.4 **Input Parameters**: To ensure that the contractor will quantitatively address the research questions and in order to minimize the subjective level of interpretation on how the input parameters should be applied, the scope of work and the contractor must strive to identify, at the onset, the method by which input parameters are applied or tested. Choices include: Best estimate method, conservative method, bounding method, and probabilistic risk assessment method. Specifically, stakeholders are concerned that the 651 pCi/g of Plutonium-239,240 in combination with 117 pCi/g of Americium-421 is high. Likewise, DOE is concerned that maximizing the conservatism of all input parameters could result in a model that lacks "reasonableness."

4.5 **Unique Site Specific Conditions**: The RFCA operates under the assumption that cleanup[p activities and cleanup levels will be sufficient to allow for a

predetermined future land use. For comparative purposes, review of the models should also consider the impact of a range of reasonably foreseeable land uses from industrial to residential. This assumption, as well as off-site land use developments, provide an important backdrop for the application of a preferred mode. In addition, other issue impacting soils include: community acceptance of institutional controls; the prospect for deployment of innovative/cost effective soils remediation technologies; the opportunity for off-site disposal of soils and building rubble; and, the importance of buffer zone preservation and critical habitat. All these issues, many of which are in flux, should be recognized when judging the applicability of the RESRAD or other models at Rocky Flats and the adequacy or appropriateness of the model inputs.

4.6 **Quality Assurance**: Quality assurance is critical to ensure that the contractors results are credible, believable and consistent with established practices for analysis of radionuclides. The scope of work must ensure appropriate quality assurance and peer review protocols.

5.0 Timeline:

General Timeline:	12 months from the date of contract
October to December '97	Convening of the oversight panel; refinement of scope of work and development and issuance of RFP.
January 1998	Award of Contract
March to December 1998	Contractor performs scope of work with quarterly technical review meetings with the panel and the public.
January to March 1999	Final Report (Panel review and peer review)

6.0 Estimated Cost:

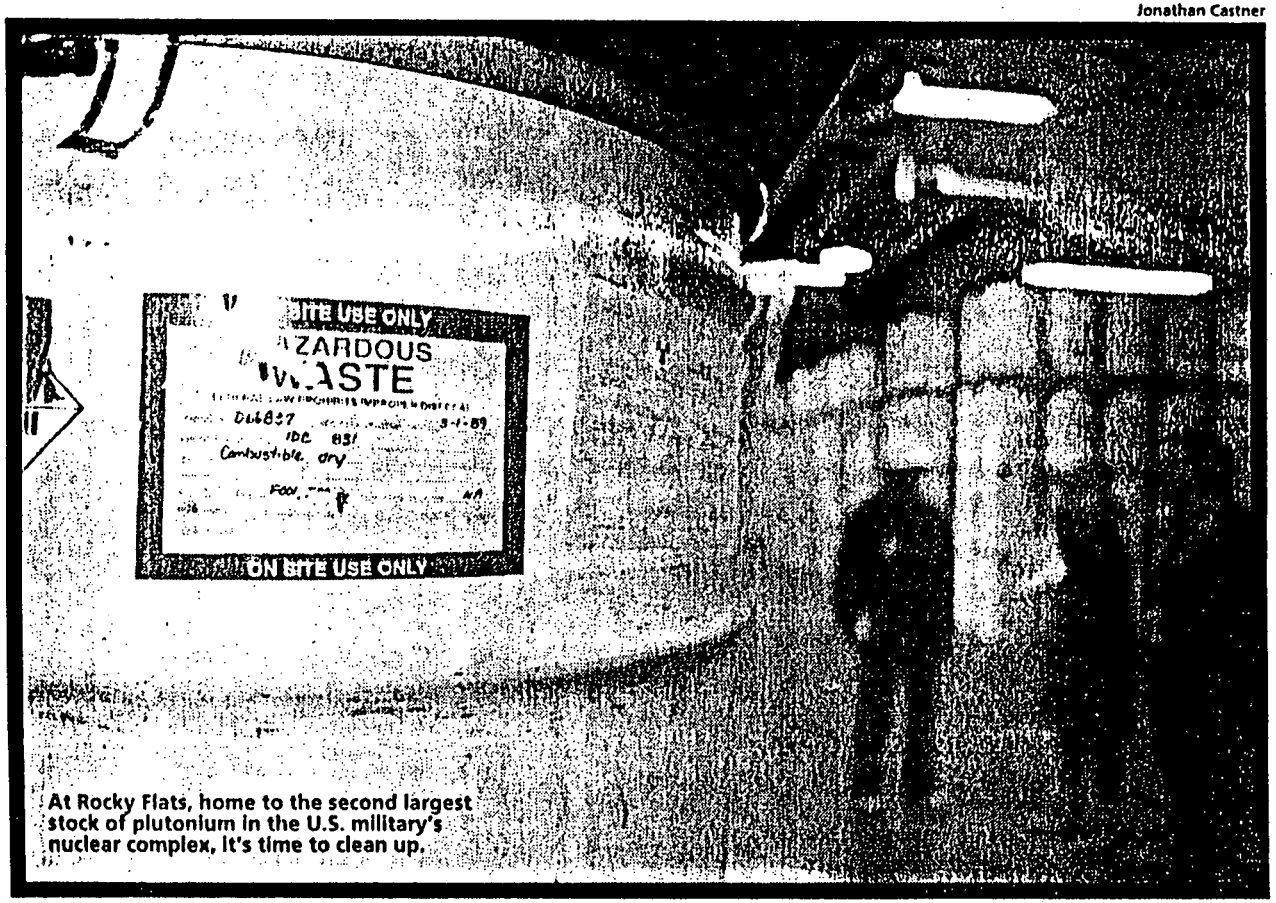
$800,000 to $1,500,000	Preliminary estimates by CDPHE

the plutonium nightmare

Rocky Flats and the nuclear legacy

by Nick Rosen

Jonathan Castner



At Rocky Flats, home to the second largest stock of plutonium in the U.S. military's nuclear complex, it's time to clean up.

It's a cold, bleak day at the west entrance of Rocky Flats, our defunct local nuke manufacturer and home to the second largest stock of plutonium in the U.S. military's nuclear complex. A handful of activists have gathered here, in front of the unsightly, corrugated steel government buildings on a palate of flat winter light. Four of them are dressed in the black robes of the Reaper to signify the lethal consequences of the Department of Energy's plans for disposing of the radioactive waste and plutonium — the radioactive legacy of the Cold War — that remains at Rocky Flats.

the wintertime."

But criticism of the plan goes beyond just the transport issues.

Many claim that the WIPP facility itself is conceptually flawed and politically motivated. Tom Marshall of Boulder's Rocky Mountain Peace and Justice Center explains that burying waste in such a facility is pleasing to bureaucrats and their political constituents because the waste is put "out of sight, and thus out of mind," in a poor, largely Chicano area of a politically weak state. And thousands of feet beneath the ground, the radioactive material is no longer monitorable or retrievable, which leaves us with a big problem if anything goes

The rally didn't turn out quite like the organizers had planned. A large crowd was meant to gather in front of the courthouse on Pearl Street to march to the west gate, but nobody showed.

That wouldn't have happened in the old days, like in October 1983 when more than 17,000 protesters formed a chain of hands and anti-nuke solidarity around the Rocky Flats facility. Of course, back then Rocky Flats was churning out "pits," plutonium-based triggers used to detonate nuclear bombs. Now, after the production of approximately 60,000 pits at the site — as well as other processes involving plutonium, uranium and a number of other radioactive and hazardous materials — it's time to clean up.

Which doesn't make for big crowds on the protest line, according to Andy Wolkstein, a member of a group with a very reasonable name, the Coalition Against a Radioactive Environment. "We're talking about disposal, not making bombs. It's not sexy. But there's still a lot to say."

Indeed there is. Two big problems now face the Department of Energy and Kaiser-Hill, the private contractor in charge of the cleanup at Rocky Flats: the thousands of cubic meters of highly radioactive waste left over from bomb production and the 12.9 metric tons of weapons-grade plutonium remaining at the site, the majority of which has been deemed by the federal government to be in excess of the amount required for "national security"(a term that rings ironic in the post-nuclear pollution age).

Cracking the WIPP

Most of the radioactive waste at Rocky Flats is transuranic (meaning it's contaminated with isotopes which are highly radioactive and have half-lives of at least 20 years) and exists in the form of gloves, coveralls, tools and even entire buildings. Kaiser-Hill has already filled 450 standard industrial drums with this waste and plans to fill thousands more. The plan is to place these barrels into large, highly durable steel containers —14 barrels in each — and load them onto trailers to be hauled away.

The Waste Isolation Pilot Plant is a huge storage facility that has been constructed in Southern New Mexico to accept the transuranic waste coming from Rocky Flats and other sites across the country. The first repository of its kind, the WIPP facility will store waste over 2,000 feet beneath the desert surface and could eventually hold more than six million cubic feet of waste in the gigantic salt deposits that constitute the local geology.

That is, if it holds any at all. The DOE has yet to receive a permit from the Hazardous and Radioactive Materials Division of the New Mexico Environment Department, as required by the Resource Conservation and Recovery Act, and the permit must be renewed every 10 years.

But even if the WIPP meets no opposition from the state, the facility and the transport plan have already come under fire by both activists and scientists. Detractors claim that the frequency of transports to the WIPP almost ensures an eventual accident. According to the proposed plan, transuranic waste will be shipped through Colorado from the Hanford uranium processing site in Richland, Wash.; the Idaho National Engineering Laboratory; and Rocky Flats. This will add up to 28,247 shipments through the state over the next 30 years, averaging between two and three shipments a day in a high-altitude region plagued with bad weather and icy roads.

The DOE and the Nuclear Regulatory Commission claim that they've taken every precaution, including the rigorous durability of transport containers, strict driver screening and the tracking of shipments by satellite. The shipments will never leave the site, says Tim Sweeney, transportation manager of the DOE's Carlsbad office, if any of the numerous weather checkpoints involved in the process report unfavorable conditions.

"Not all government bureaucrats are stupid," says Sweeney, "We know it snows in

wrong.

According to Dr. Arjun Makhijani of the Institute for Energy and Environmental Research, the DOE and the EPA (which certifies and regulates the WIPP facility) have not adequately considered the long-term effects of pressurized brine reservoirs which could have an effect on the geological integrity of the area, or the possibility of future resource exploitation and intrusion into the site.

Makhijani also says the federal government is spending money on WIPP when it's needed elsewhere. "WIPP is a diversion of very scarce resources from the most important problems of transuranic waste management. WIPP addresses those transuranic wastes which are the least risky in the short and medium term." These are wastes which have been properly packed and stored in fifty-gallon drums which contain the radiation. The "most risky" transuranic wastes, the doctor explains, are those which are buried underground or consist of highly contaminated soils. This kind of waste presently contaminates (or threatens to contaminate) water at a number of DOE cleanup sites around the country. It's these imminent situations which Dr. Makhijani believes should be taken care of first.

Also worthy of scrutiny is the fact that the management and operations contract for the WIPP facility is in the hands of the

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ess pure forms of waste can be problematic. Experience has shown that the process can be very complicated and expensive. You have to design a melter for each different form of waste," because the composition of transuranic wastes is varied and unpredictable.

For this problem, like many others involving the nationwide radioactive residue of the Cold War, there are no easy answers.

The MOX cocktail

Plutonium-239 is a nasty isotope, so much so that it requires far more arduous disposal plans than simply burying it at the WIPP facility. Pu-239 emits alpha radiation, which upon entering the body through the mouth or nose immediately begins feasting on living tissues, usually the liver and bones. Once it's nestled comfortably in the body, it causes severe biological damage in the form of cancer. Pu-239 was used to make nuclear bombs, which when detonated, can destroy thousands of lives in an instant.

It's no wonder, then, that the United States is eager to destroy all of its "excess" plutonium. In the post-Cold-War world, the biggest threat to our national security is that of "rogue" states or international terrorists, who are constantly trying to get their hands on nuclear weapon materials.

high price for this weapons-usable material.

It still remains unclear whether the MOX method or immobilization — which could take various forms and is preferred by the Institute for Energy and Environmental Research, the Nuclear Control Institute and many other scientific and public interest organizations — will become the preferred mode of disposition in our country. But despite a letter sent to President Clinton signed by representatives of 171 environmental and anti-nuclear groups from around the world which beseeched the U.S. not to burn plutonium, many believe that U.S. officials are leaning toward the MOX solution. Such a policy would mean a break with the decades-old U.S. policy which keeps the two sides of the nation's atomic industry — the military side and the energy-based civilian side — safely apart. It's only logical that nuclear materials with weapons-making capability can be better regulated by the defense forces than by the private sector. All this means that Rocky Flats plutonium could be headed for civilian reactors and — who knows? — eventually wind up in the malevolent paws of a Saddam Hussein. Of course, this scenario is far less likely in the United States than it is in some of the other countries for which U.S. policy sets an example.

But long before plutonium from our local

es to the agency or its private contractors when it comes to matters of the cleanup. For years, Rockwell International operated at the site in violation of federal environmental laws, only to be raided by the Federal Bureau of Investigation and the Environmental Protection Agency in 1989. While Rocky Flats in turn sued the government on the grounds that it was forced to violate laws to keep up with the pace of DOE weapons orders, the feds granted the new contractor, EG&G, total exemption from liability.

In the end, the DOE and Rockwell were stuck with the bill, and Rocky Flats was put on the federal Superfund National Priorities List. This serves as little consolation to either former employees or locals. Almost 50 employees at the site, many of whom handled the triggers directly, have been put on long-term disability, and a number of the buildings at Rocky Flats have been dangerously contaminated. A 1994 DOE study put five of the Rocky Flats buildings on a national top-10 list of facilities with dangerous "plutonium vulnerability," and Rocky Flats is home to the notorious Building 771, the single most radioactive structure in the country.

Of course, the DOE and Kaiser-Hill see these problems as remnants of the past and speak proudly of the successful

pollution

"Things have definitely changed," says LeRoy Moore, an old war-horse of the anti-nuke movement, reflecting on the low turnout at Saturday's rally. It sure is a long walk from the Pearl Street Mall to Rocky Flats, too long for "unsexy" issues on a cold day. But when thinking of the radioactive behemoth next to our cozy little town, the distance doesn't seem so far. According to Cold War philosophy, the Pearl Street Mall has much to thank Rocky Flats for. The apocalyptic fury manufactured there protected the affluent democracy epitomized by Gap for Kids and Old Chicago, making the world safe for designer jeans and multi-topping pizza. And so far, the theory of mutually-assured destruction has worked. Besides those little incidents at Hiroshima and Nagasaki (which, many nuclear proponents will tell you, saved lives), the bombs were never dropped.

But Moore is right. Now things are different. The byproduct of nuclear protection is a pile of cancer-causing garbage that can't be thrown away and a crowd of third-world despots and terrorists who don't know that nuclear bombs went out of style almost a decade ago. And despite the end of the Cold War, we're still making bombs — just to be safe. BW

Westinghouse Electric Corporation. Westinghouse is a former giant of the nuclear weapons industry which processed uranium for bombs at the Hanford facility in Southeastern Washington. Westinghouse was then given a five-year contract to clean up the mess they made — and profited handsomely from — at Hanford. In 1994, the General Accounting Office found that Westinghouse had wasted millions of federal dollars in the cleanup there, and to little avail — the site remains not only polluted, but potentially explosive.

But like many of the big nuke makers, Westinghouse continues to benefit from either a short memory or a munificent forgiveness on the part of the federal government. As David Madison of the *Boise* (Idaho) *Weekly* notes, "Just as it was firing Westinghouse from the Hanford job, DOE renewed the company's cleanup contract at the Savannah River waste site, where it milked big defense budgets in the Cold War effort to produce materials for nuclear warheads." The DOE also renewed the company's five-year WIPP contract through 2000 on the order of $87 million to $90 million per year.

Of course, if we don't put transuranic waste in the WIPP, it will stay at Rocky Flats, in our backyard. Opponents like Marshall would advocate as an alternative the vitrification — conversion into a glass or ceramic form — of the plutonium to stabilize it on-site. Ironically, vitrification proponents advocate the use of even more radioactive waste to surround the vitrified waste, thus protecting it from tampering. Kaiser-Hill spokesperson Jennifer Thompson points out that this protective coating would probably be composed of high-level waste, which she says does not exist at the site and would have to be shipped in to Rocky Flats. Additionally, Thompson says that if a successful vitrification facility was created at Rocky Flats, transuranic waste from other sites would probably be shipped there for conversion. Needless to say, these threats have garnered large support for the WIPP plan from local government officials.

And while Dr. Makhijani is no fan of the WIPP, he is also skeptical of the vitrification of transuranic waste. He says that while vitrifying pure plutonium is viable, "doing it with

As part of a nonproliferation agreement, the U.S. and Russia have put together a bilateral study on the disposition of plutonium. This is not an easy task — the conversion of plutonium into a form which is unusable for making nuclear weapons is difficult and expensive, and unlike the U.S., Russia still regards excess plutonium as a valuable energy resource. Despite the differences in opinion, however, the U.S. seems to have acquiesced to the Russians, making the conversion of plutonium into mixed oxide (MOX) fuel for burning in civilian generators a viable option. This process has been criticized for a number of reasons, not the least of which is that burning MOX does not destroy all of the plutonium. Some of it is left over, and the fission process which takes place in the reactor actually creates additional plutonium, leaving a significant quantity on the spent fuel rods. The plutonium could then be extracted from the mix and reprocessed to a form which, some scientists say, could be used to create nuclear bombs. In fact, the U.S./Russian study, which was signed by the science advisors to both Yeltsin and Clinton, even leaves the possibility that the Russian government could follow through with its stated desire to recover the separated plutonium after a number of years. The Institute for Energy and Environmental Research warns that this policy could lead to a "plutonium renaissance," noting that, "While the Russian government may not want to use reactor-grade plutonium in weapons, some non-nuclear governments or terrorist organizations may be willing to pay a

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"I'm very surprised how quickly, and without due respect of the uncertainties, the Rocky Flats' cleanup guidelines were adopted." — *Bernd Franke*

atomic disaster area reaches the fission chamber, it will continue to burn with controversy. Those who were concerned about the shipping of relatively diluted transuranic waste to New Mexico can take little comfort in truckloads of pure weapons-grade plutonium cruising down the interstate on its way to an interim storage facility, where it could potentially be converted into reactor fuel.

And while we may be glad to get rid of it, the neighbors of these interim facilities are not exactly grateful. People who live near nuclear weapons sites in South Carolina and Texas, the two interim destinations for Rocky Flats plutonium, came to Denver last month to voice their opposition to the relocation plan. One farmer who neighbors the Pantex facility outside of Amarillo, Texas said angrily, "It's totally asinine to process plutonium in the middle of a highly productive agricultural area. This area is known as the bread basket of the United States. It's like putting plutonium in your cereal bowl."

Don Moniak of the group Serious Texans Against Nuclear Dumping pointed to the hypocrisy of the DOE's plan to keep plutonium away from Denver's two million residents by storing it near a smaller metropolitan area. "While Rocky Flats plutonium is considered a threat to Denver," Moniak said, "it is not considered enough of a threat to keep it away from Amarillo, Texas."

Rocky stats

Given the DOE's horrible record, it's no wonder why local activists give no inch-

conclusion to the cleanup.

But it is unclear when this conclusion will be reached, or how successful it will be. In June 1996, with much fanfare, DOE Assistant Secretary of Environmental Management Al Alm announced his vision, "Accelerating Cleanup: Focus on 2006," to finish most DOE sites, including Rocky Flats, in the next 10 years. But before they'd heard about Alm's announcement, Kaiser-Hill announced a 2010 finish date. Even now, Thompson says that Kaiser-Hill cannot cleanup the site by 2006 given the current funding and equipment.

And local activists like Tom Marshall are frightened by the DOE's haste. "In our opinion, the DOE should be striving for a credible cleanup," says Marshall. "They should be striving for quality and not necessarily meeting artificial timelines trying to please Congress."

Furthermore, he questions the "acceptable levels" to which soils at Rocky Flats will be decontaminated. A letter sent to DOE officials by 17 organizations requested a review of both the level of radiation left in the soil and the degree to which the planned cleanup will meet those levels. The DOE has approved a citizens' panel to review the planned cleanup but has not funded an analysis of whether the radiation levels (which allow for the exposure of 15 millirem per year in excess of background levels or 85 millirem in the absence of "natural controls" such as fences) are sufficient for the protection of public health.

And some say that the cleanup standards are less stringent than other DOE sites. Bernd Franke, an environmental risk assessment expert of 20 years, says that Rocky Flats will not meet the specifications set at other DOE sites that he has worked at in the Marshall Islands. Given the lessons learned at other sites, says Franke, "I am very surprised how quickly, and without due respect of the uncertainties (such as the fallibility of radiation detectors), the Rocky Flats cleanup guidelines were adopted."

Mutually-assured